PHYSICS ABSTRACTS

BEING

SCIENCE ABSTRACTS—SECTION A

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ABSTRACTS 2646–2968

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ANNUAL INDEX

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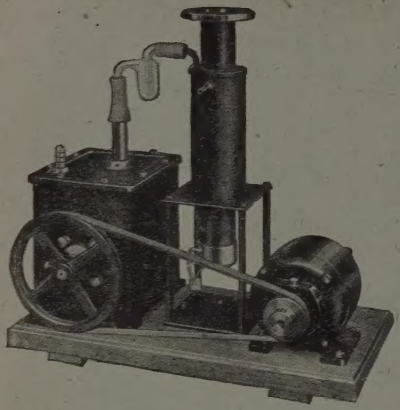

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VARIOUS SUBJECTS

See Abstr. 2945 358.4 : 551.5

MATHEMATICS

2646 512.31 : 519.281.2

The advantages in using orthogonalized terms in a polynomial for curve-fitting. SATAKOPAN, V. *Indian J. Phys.*, 17, *pp.* 115–120, *April*, 1943.—Discusses the relation betw. least-squares solutions of polynomial constants obtained by using ordinary power terms [Abstr. 10 (1942)] or orthogonalized terms, when the polynomial is fitted to a series of observations. All the constants of polynomials up to the *r*th deg. obtained by using simple power terms can be determined from the $(r + 1)$ constants obtained from the orthogonal terms.

2647 512.37

A method for finding roots of algebraic equations. LIN SHIH-NGE. *J. Math. Phys.*, 22, *pp.* 60–77, *June*, 1943.—The method offers a convenient solution for all types of quartic equations having complex roots. Equations of deg. > 6 can also be rapidly solved if the roots are widely separated.

2648 512.37 : 518.42

The quintic "hypernom" for the equation $x^5 + Ax^3 + Bx^2 + Cx + D = 0$. ADAMS, D. P. *J. Math. Phys.*, 22, *pp.* 78–92, *June*, 1943.—Describes a graphical method for finding the roots of polynomial equations through the 5th deg.

2649 512.974

Polyadic products. HOSTETTER, I. M. *J. Math. Phys.*, 22, *pp.* 93–114, *June*, 1943.—The paper attempts a direct employment of the Gibbs notation to the definition of a variety of operational functions of polyadics, which are called products. Sets of these functions applied to a polyadic A characterize the ranks of the various matrices associated with A. With their aid, sets of scalar invariants of A are obtained which exist as coeff. in the expansion of sets of characteristic λ determinants.

2650 513.49

On the construction of curves of constant width. GERE, B. H., AND ZUPNIK, D. *J. Math. Phys.*, 22, *pp.* 31–36, *May*, 1943.—The problem is to find the type of configuration which may be used to construct a curve of const. width. Exact conditions upon the parts of such a configuration are presented and a general method of construction is given.

2651 517.392(083.5)

Table of coefficients in numerical integration formulae. LOWAN, A. N., AND SALZER, H. *J. Math. Phys.*, 22, *pp.* 49–50, *June*, 1943.

2652 517,512 : 517.942.6

A note on Sonine's polynomials. I. BASU, K. *Bull. Calcutta Math. Soc.*, 35, *pp.* 21–32, *March*, 1943.—The construction from a generating function analogous to that for Laguerre polynomials, evaluation of def. integrals involving products of Sonine functions, establishment of recurring formulae, and representation of the function in terms of contour integrals, are discussed.

2653 517.512.2

Numerical Fourier analysis to twenty-nine harmonics. MACEWAN, D., AND BEEVERS, C. A. *Nature, Lond.*, 152, *pp.* 302–303, *Sept.* 11, 1943.

2654 517.522.3

On the convergence of trigonometric series. ERDÖS, P. *J. Math. Phys.*, 22, *pp.* 37–39, *May*, 1943.

2655 517.564.3

An asymptotic expansion of $Ji_0(x) = \int_x^\infty \frac{J_0(t)}{t} dt$.

SMITH, V. G. *J. Math. Phys.*, 22, *pp.* 58–59, *June*, 1943.

2656 517.564.3(083.5)

Table of $Ji_0(x) = \int_x^\infty \frac{J_0(t)}{t} dt$ and related functions.

LOWAN, A. N., BLANCH, G., AND ABRAMOWITZ, M. *J. Math. Phys.*, 22, *pp.* 51–57, *June*, 1943.

2657 517.564.3(083.5)

Table of the integrals $\int_0^x J_0(t)dt$ and $\int_0^x Y_0(t)dt$.

LOWAN, A. N., AND ABRAMOWITZ, M. *J. Math. Phys.*, 22, *pp.* 2–12, *May*, 1943.

2658 517.564.3 : 517.65

Some infinite integrals involving Bessel functions. GUPTA, H. C. *Bull. Calcutta Math. Soc.*, 35, *pp.* 7–11, *March*, 1943.—The integrals investigated are general and their integrands contain either the product of 2 or more Bessel functions or the product of a Bessel function and two parabolic cylinder functions.

2659 517.63 : 621.392.5 : 621.3.014.1

Closed-form steady-state response of networks. FRANKEL, S. *Communications*, 23, *pp.* 30–32, 34, 36, 74 *and* 76, *April, and pp.* 38–39, 42–43, *and* 72, *May*, 1943.—[Abstr. 2179 B (1943)].

See Abstr. 2658 517.65 : 517.564.3

2660 517.65 : 535.1(083.5)

An integral related to the radiation integrals. POWELL, E. O. *Phil. Mag.*, 34, *pp.* 600–607, *Sept.*, 1943.

2661 517.941.91

On the existence of periodic solutions for second-order differential equations with a forcing term. LEVINSON, N. *J. Math. Phys.*, 22, *pp.* 41–48, *June*, 1943.—It is shown that, subject to certain conditions on $f(x, v)$ and $g(x)$, the system $dx/dt = v$, $dv/dt = -f(x, v)v - g(x) + e(t)$, where $e(t)$ is a periodic function of period L, has at least 1 solution of period L [see Abstr. 1298 (1943)].

See Abstr. 2652 517.942.6 : 517.512

2662 517.947.42 : 518.5

Numerical solution of the boundary-value problem for the potential equation by means of punched cards. KORMES, M. *Rev. Sci. Instrum.*, 14, *pp.* 248–250, *Aug.*, 1943.—The differential equation is replaced by a finite-difference equation and for a sufficiently fine net the value of the solution is assumed reasonably close

to the known boundary values. These net-point values are transferred to punched cards and, by repeated machine operations, successive approximations are computed mechanically. The method is suitable for use with std. I.B.M. or Remington Rand equipment. [See Abstr. 1836 (1943)].

2663 518.3 : 536.71

Nomograph for *P-V-T* relations of gases below the critical point. THOMSON, G. W. *Industr. Engng Chem.*, 35, *p.* 895, *Aug.*, 1943.

See Abstr. 2648 518.42 : 512.37

See Abstr. 2662 518.5 : 517.947.42

See Abstr. 2924 518.5 : 545.2 : 615.9 : 542.48

2664 518.5 : 621.3.011.2

A reciprocal slide rule for parallel resistors. PAINE, R. C. *Communications*, 23, *pp.* 16–17, 86 *and* 91, *July*, 1943.

2665 519.24 : 621.395 : 634.9 : 620.11

The statistical control of quality. Application of statistical inspection in the telephone industry. VROOM, H. H. **The use of statistical methods in forestry.** DWIGHT, T. W. *Engng J. Can.*, 26, *pp.* 398–403, *July*, 1943.—[Abstr. 2336 B (1943)].

2666 519.272 : 519.48

On two types of correlation function. GHOSH, B. *Sci. and Cult.*, 9, *p.* 46, *July*, 1943.—[See Abstr. 2113 (1943)].

See Abstr. 2646 519.281.2 : 512.31

See Abstr. 2678 519.281.3 : 523.841.9.035.91

See Abstr. 2666 519.48 : 519.272

ASTRONOMY. GEODESY

2667 522.617.3 : 523.841.3

Photo-electric colorimetry of the variable star α^2 CVen. NIKONOV, V., AND BRODSKAJA, E. *Bull. Acad. Sci. Georgian SSR.*, 3, 7, *pp.* 657–661, 1942.—Photo-electric colour equivalents of this star were obtained at Abastumani from March to July, 1941, using an Sb-Cs photocell and colour filters giving effective wavelengths of 4 060 Å and 5 280 Å. The scale of colour equivalents is reduced to that of gradients by observing 14 stars of the Greenwich catalogue. The amplitude in colour temperature is 2 000° as compared with Tai's 10 000° [Abstr. 676 (1940)]. A. HU.

2668 522.617.3 : 523.872

On the photo-electric colorimetry of the B_8–B_9 stars carried on at the Abastumani Astrophysical Observatory. NIKONOV, V. *Bull. Acad. Sci. Georgian SSR.*, 3, 6, *pp.* 509–514, 1942.—Since mid-1940 the B_8–B_9 stars brighter than 7·5 mag. within 20° of the galactic equator have been observed at Mt. Kanobili with an Sb-Cs photocell attached to a 33 cm. aluminized reflector. Effective wavelengths of 5 280 Å and 4 060 Å are obtained by the use of colour filters. The cell is of higher sensitivity, higher range, and greater stability than the best K cells. Atmospheric extinction coefficients are determined throughout each observing night by comparing the programme stars with std. stars of known extra-atmospheric colour equivalents. The probable error of a single observation of colour equivalent is about ± 0·01 mag. on the international scale of colour indices. A. HU.

2669 522.91

The calculation of probable errors from residuals: paradox. JACKSON, J. *Observatory*, 65, *pp.* 9–1 *April*, 1943.—Two standard methods of calculati probable errors from residuals in parallax dete minations, using different equations of condition d rived from the same data and resulting in the sar normal equations, are shown to lead to incompatib values for the probable error of unit weight. Th discrepancy arises from neglecting the products residuals incorrectly assumed to be equally often po and neg. In general the total of the cross products negative and not negligible. A. H

2670 523.34

The distribution and the probable origin of the lun craters. SCOTT, W. *Contr. Soc. Res. Meteorite* 3, 1, *pp.* 31–36, 1942.—Whereas it has been shown th a special type of lunar craters follows a random di tribution on the visible portion of the moon and thus best explained as being due to meteoric origin, careful analysis of over 3 000 typical craters shov them to be very probably distributed in a non-rando manner. It is suggested that these craters are of vo canic origin. R. H. C

2671 523.51 : 621.318.381

Meteorite detectors. PAZ, L. LA. *Contr. So Res. Meteorites*, 3, 1, *pp.* 9–17, 1942.—Variou methods can be employed to detect meteorites whic are buried below max. ploughing depth. Th principles underlying the operations of instrumen which measure the distortion of the magnetic field ar difficulties encountered in their use are describe These could be overcome and satisfactory results we obtained in field investigations. R. H. C

2672 523.51 : 621.318.381

Synthetic symmetry in mutual-induction balances: practical problem with meteorite detectors. WISMA F. O. *Contr. Soc. Res. Meteorites*, 3, 1, *pp.* 18–2 1942.—In order to overcome some of the difficultie encountered in the use of an earlier detector which wa based on the principle of a mutual-induction balanc the electrical circuit characteristics to be fulfilled b such a device are investigated. The newly develope instrument is stated to be superior to any comparab instrument with respect to its weight, its bulk, and i power-supply requirements. R. H. C

2673 523.59

Zodiacal light at Poona. SINGH, J. *Curr. Sci.*, 1 *p.* 207, *July*, 1943.

See Abstr. 2951 523.746 : 551.521.63

2674 523.746 : 551.590.21

The long-period variations in the length of the 11-yea solar period, and concurrent variations in terrestri phenomena. CLOUGH, H. W. *J. Amer. Met. Soc* 24, *pp.* 154–162, *April*, 1943.—Long-period variation in solar phenomena are shown by the rel. numbers a epochs of max. and the intervals between successiv max. or min. The existence of long-period variation in the length of the 11 yr. period is shown by graphical periodicity tabulation of the 11 yr. interval since 301. A 37 yr. period is shown by the existenc of max. every third or fourth interval, and an 83 y period is shown by a similar tabulation of th smoothed intervals. The meteorological effect following certain solar changes are summarized.

2675 523.774

Thorium in the sun. SITTERLY, C. M., AND KING, A. S. *Proc. Amer. Phil. Soc.*, 86, 3, *pp.* 339–341, 1943.—From furnace spectra of Th I and Th II, and estimated intensities of the low-temp. lines, there is no evidence of the presence of Th I in the sun, but the *raie ultime* of Th II at 4 019 Å is probably present but faint. A table gives the present position of elements identified in and missing from the solar spectrum. A. HU.

2676 523.774

Profiles in the alpha band of atmospheric oxygen. PANOFSKY, H. A. A. *Astrophys. J.*, 98, *p.* 136, *July*, 1943.—Errata. [Abstr. 2119 (1943)].

See Abstr. 2684 523.823.5 : 523.875

See Abstr. 2681 523.841.11 : 523.872 = 3

See Abstr. 2683 523.841.12 : 523.874

2677 523.841.3

Variable stars and the sources of stellar energy. PAYNE-GAPOSCHKIN, C., AND GAPOSCHKIN, S. *Proc. Amer. Phil. Soc.*, 86, 3, *pp.* 329–338, 1943.—The summarized results of a study of the physical properties of variable stars are presented in tabular form. The stellar model most appropriate to these data is deduced, and the likely central temperatures derived. All the intrinsic variables have central temperatures too low for operating the C cycle, but the several types (and even the progression of properties within the types) may be individually related to the subatomic processes depending on Li, Be and B. A. HU.

See Abstr. 2667 523.841.3 : 522.617.3

2678 523.841.9.035.91 : 519.281.3

An application of the method of least squares to the adjustment of photometric elements of eclipsing binaries. KOPAL, Z. *Proc. Amer. Phil. Soc.*, 86, 3, *pp.* 342–350, 1943.—Equations are given for correcting by least squares the elements of eclipsing binaries consisting of 2 spherical components revolving in circular orbits. The corrections are given in a closed form for uniform and darkened discs, and for all types of eclipse, and are expressed in terms of functions already familiar in the theory of light curves of close eclipsing systems. The corrections are evaluable in terms of existing α-functions. The method is applied to AR Cass and to α CorB. A. HU.

2679 523.841.9.035.924

The effects of reflection upon light and velocity curves of close binary systems. KOPAL, Z. *Proc. Amer. Phil. Soc.*, 86, 3, *pp.* 351–363, 1943.—The amount of light reflected by components of eclipsing binary systems outside eclipse as well as within the minima is investigated. Formulae are given for reducing bolometric curves to light curves observed in narrow spectral ranges, and the phase law is modified for eccentric orbits. The reflected light contributes to the radial velocities and causes systematic errors in the velocity curves, thence vitiating certain elements of the spectroscopic orbits. A. HU.

2680 523.842.2

Orbital motion of 61 Cygni. STRAND, K. A. *Proc. Amer. Phil. Soc.*, 86, 3, *pp.* 364–367, 1943.—Photographic observations of this double star taken over a period of 28 years show perturbations which can be explained best by assuming the presence of a third invisible component with a mass 16 times that of Jupiter. This planetary companion has an eccentric orbit, a period of 5 years, and a mean distance from its primary of 2 astronomical units. A. HU.

See Abstr. 2668 523.872 : 522.617.3

2681 523.872 : 523.841.11 = 3

Spectrum of Nova Puppis. WALDMEIER, M. *Z. Astrophys.*, 22, *pp.* 117–121, 1943.—Low-dispersion spectrograms (Hα to Hδ = 4 mm.) of the nova were obtained at Arosa on Nov. 14, 15, and 16 with an objective prism fitted to an *f*/3·5 Leica camera. A list of emission lines and their identifications shows that H, Na I, O I, Fe II, and Ti II contributed the most intense lines at max. light. The radial velocities shown by the absorption components are of the order 2 000–3 000 km./sec. They increase with time in the Balmer lines but are const. in the *D* lines. Comparisons of the continuum on Nov. 15 with that of Sirius give a colour temperature of about 9 500°. A. HU.

2682 523.872 : 535.243

Six-colour photometry of stars. I. The law of space-reddening from the colours of O and B stars. STEBBINS, J., AND WHITFORD, A. E. *Astrophys. J.*, 98, *pp.* 20–32, *July*, 1943.—Describes a photo-electric photometer which, with 6 colour filters selecting regions of the spectrum from the near ultra-violet to about 1 030 mμ, enables measurements to be made of the colours of stars and nebulae. With a 60 in. reflector, stars of the 9th mag. can be measured. Results are given for 69 stars of spectrum O and B with various degrees of reddening due to interstellar material. The law of selective absorption is the same for all directions in the Galaxy. The $1/\lambda$ law is not strictly obeyed; intermediate regions are fainter than they would be if this law held over the whole of the spectrum range studied. J. W. T. W.

2683 523.874 : 523.841.12

On the physical origin of P Cygni-type absorption lines in the spectrum of M.W.C.374. BEALS, C. S. *J. Roy. Astr. Soc. Can.*, 37, *pp.* 241–252, *July–Aug.*, 1943.—The profiles of the H lines in the spectrum of this star and their shift of 50 km./sec. to the red are attributed to absorption by a layer of atoms located at a greater height above the stellar surface than the emitting layer. Theoretical reasons are given for believing that the displaced absorption lines in all P Cygni-type stars originate in such a layer. The effect of the layer in modifying the emission-line profiles depends on the velocity gradient of the ejected atoms. A. HU.

2684 523.875 : 523.823.5

Luminosity-radius relation for white dwarf stars. BHATNAGAR, P. L. *Observatory*, 65, *pp.* 95–96, *Oct.*, 1943.—The theory of degenerate stellar configurations is extended to cases where the outer classical fringe is comparable in size with the inner collapsed core. Relations given betw. luminosity and radius and betw. luminosity and effective temperature show that degeneracy begins in a star of mass $\frac{1}{2}$ that of the sun at a luminosity and an effective temperature much higher than those of an ordinary white dwarf, and comparable with those of the central star of the Crab nebula [Abstr. 562 (1943)]. A. HU.

2685 525.75 : 551.593

Light of the night sky. MITRA, S. K. *Sci. and Cult.*, 9, *pp.* 46–48, *April*, 1943.

PHYSICS: GENERAL

See Abstr. 2946 53 : 551.5

2686 53 : 621.3 : 66

Applications of physics in chemical industry. MEE, A. J. *J. Sci. Instrum.*, 20, *pp.* 137–141, *Sept.*, 1943.—A survey of recent advances, with sp. ref. to measurements of viscosity and refr. index, *p*H control, polarographic and electrometric analysis, photocells, X-ray and electron-microscope examination and magnetic flaw detection.

2687 53 : 623.446

Physics of bows and arrows. KLOPSTEG, P. E. *Amer. J. Phys.*, 11, *pp.* 175–192, *Aug.*, 1943.—An account of the application of physics to problems in archery, showing how physical research and development have improved the implements of the sport. Types of bows and "force/draw" curves are illustrated, showing elastic hysteresis of the bow material. Mass/velocity relationships of arrows are dealt with, and considerations leading to the scientific design of a bow are presented. High-speed spark photography has been applied to studying the behaviour of the arrow in its passage by the bow, following its release. The importance of matching the arrow to the bow is manifest from these photographs. Concluding paragraphs deal with the flight of an arrow and its penetration, aiming, and experimental apparatus. A. E. T.

2688 53 : 66

The physicist in the chemical industry. BOSWORTH, R. C. L. *J. Sci. Instrum.*, 20, *pp.* 142–145, *Sept.*, 1943.—The help which the special knowledge and training of the physicist can give to the chemical industry is discussed under the headings: problems arising in the development from laboratory to plant scale and which are often inherent in the mere physical dimensions of the large-scale equipment, the control of process variables, including testing methods and equipment, and the physics of non-idealized situations. In conclusion, a physics course for the chemical industry is outlined, and ref. is made to the special mathematical knowledge which will prove useful for the industrial chemist. R. H. G.

2689 53 : 727

The new laboratory of physics at Northwestern University. SPENCE, B. J. *Amer. J. Phys.*, 11, *pp.* 208–218, *Aug.*, 1943.

2690 53.084.837 : 533.5

The use of Wood's metal in vacuum systems. HUGHES, A. L., AND PAO, C. S. *Rev. Sci. Instrum.*, 14, *pp.* 254–255, *Aug.*, 1943.

2691 530.12

Clocks, rigid rods and relativity theory. INFELD, L. *Amer. J. Phys.*, 11, *pp.* 219–222, *Aug.*, 1943.—[See Abstr. 2993 (1942)].

2692 530.12

The time concept in restricted relativity. DINGLE, H. *Amer. J. Phys.*, 11, *pp.* 228–230, *Aug.*, 1943.—[See Abstr. 2993 (1942)].

2693 530.145.61

The fundamental equation of quantum mechanics. FLINT, H. T. *Phil. Mag.*, 34, *pp.* 496–502, *July*, 1943.—The author proposes a second-order differential equation for the electron which is relativistically invariant and forms a generalization of Schrödinger's original equation. The underlying geometrical framework is a 5-dimensional one and gravitational effects are neglected. The equation obtained is discussed in the first approximation, and it is shown that Dirac's additional term for the energy of the electron can be obtained from it. G. C. McV.

2694 530.145.63 : 539.153

Capture of a slow-moving directed electron in a Coulomb field of force. MORGANS, W. R. *Phil. Mag.*, 34, *pp.* 537–549, *Aug.*, 1943.—A mathematical paper in which the problem of capture of electrons is dealt with, using parabolic co-ordinates. The probability of spontaneous transition is calculated. A. J. M.

See Abstr. 2813 531.19 : 536.7

2695 531.25

Infinitesimal bending of a surface. SILBERSTEIN, L. *Phil. Mag.*, 34, *pp.* 549–554, *Aug.*, 1943.—Weingarten's equations are rewritten in compact vector form, and an alternative, simpler, form is developed. From the equations it is learned that, unless the surface be a plane, a purely normal bending-displacement is impossible. The structure of the equations is simplified for a surface of revolution and the bending of a sphere is examined, with the result that the sphere cannot be bent into any surface of revolution without cutting. G. E. A.

2696 531.259

On plane strain and plane stress in aeolotropic bodies. GHOSH, S. *Bull. Calcutta Math. Soc.*, 34, *pp.* 157–169, *Dec.*, 1942.—The fundamental question whether such a body can at all be in a state of plane strain or plane stress, and if so under what conditions, is examined, and the analysis brings out that the only possible stress functions in plane stress in the xy plane are polynomials of the sixth degree in x, y. The assumption of plane stress under an arbitrary distribution of surface tractions on the rim is unwarranted. G. E. A.

2697 531.715 : 621.317.39

Detecting small mechanical movements. FROMMER, J. C. *Electronics*, 16, *pp.* 104–105, *July*, 1943.—[Abstr. 2449 B (1943)].

2698 531.724

An absolute method for the determination of the area of a fine crystalline powder. HARKINS, W. D. AND JURA, G. *J. Chem. Phys.*, 11, *p.* 430, *Sept.*, 1943.

2699 531.731.3

The determination of volumes by the use of carbon dioxide. BARKAS, W. W., AND PATON, J. M. *J. Sci. Instrum.*, 20, *pp.* 163–164, *Oct.*, 1943.—A method is given for calibrating an unknown irregular volume by filling with CO_2 to a known pressure and determining the weight of the CO_2 after absorption by soda asbestos.

2700 531.754 : 675

Density of leather and its significance. KANAGY, J. R., AND WALLACE, E. L. *J. Res. Nat. Bur. Stand., Wash.*, 31, *pp.* 169–180, *Sept.*, 1943.—The real density

of leather calculated from the weight of a measured volume, allowing for voids, and the apparent density, not allowing for voids, were studied. The real-density values of different samples were determined by a method in which Boyle's law is applied. The apparent density by direct dimensional measurement and by displacement of mercury, is compared with the real density. The real densities of most of the samples vary within a narrow range (1·387 to 1·516), whereas the apparent densities vary over a greater range, depending upon the treatment. The influence of location of the specimen on the hide on real density is considered, and results that show the effect of compression on both densities are given. Moisture content has considerable influence on the real density.

2701 531.76 : 621.317.39

Electronic time meter. *Rev. Sci. Instrum.*, 14, *pp.* 255, *Aug.*, 1943.

2702 531.78 : 66.063

Power consumption of propeller-type agitators. STOOPS, C. E., AND LOVELL, C. L. *Industr. Engng Chem.*, 35, *pp.* 845–850, *Aug.*, 1943.—The dynamometer used to measure the shaft power is described. The data are correlated by dimensional analysis. No critical value is found for the modified Reynolds number.

2703 531.781.2

A modification of the C.F.R. bouncing-pin spring-tension balance and instructions for use. DRAPER, P. *J. Inst. Petrol*, 29, *pp.* 253–257, *Sept.*, 1943.—Describes improvements giving certain advantages over the original model. [Abstr. 595 (1943)].

2704 531.786

An improved transmission dynamometer. CRAWFORD, A. E. *J. Sci. Instrum.*, 20, *p.* 163, *Oct.*, 1943.—An Ayrton–Perry type dynamometer consisting of a split coupling, with the torque from one half to the other transmitted by springs and the rel. ang. displacement of the halves indicated by a pointer, is described.

2705 532 : 621.317.39.083.7

Telemetering of fluids. I–III. *Mech. World*, *pp.* 88–89, *July* 23; 133, *July* 30, *and pp.* 165–166, *Aug.* 8, 1943.—[Abstr. 2454 B (1943)].

2706 532.123

Examination of the Berthelot method of measuring tension in liquids. VINCENT, R. S., AND SIMMONDS, G. H. *Proc. Phys. Soc., Lond.*, 55, *pp.* 376–382, *Sept.*, 1943.—A modified method in which the pressure at the moment of sealing is known gives values $\gtrsim$ 25 atm. compared with $\sim$ 150 atm., which are considered likely to be falsely high, by the normal method. The order of magnitude agrees with the values obtained by the viscosity-tonometer method.

N. M. B.

2707 532.133

Viscosities of the methane-propane system. BICHER, L. B., JR., AND KATZ, D. L. *Industr. Engng Chem.*, 35, *pp.* 754–761, *July*, 1943.—The viscosities were determined at pressures from 400–5 000 lb./in.^{2} at 77°–437°F. in a rolling-ball inclined-tube viscometer. The data are correlated by the mol. wt., pseudo-reduced temperature, and pseudo-reduced pressure, with an average deviation of 2·9%.

2708 532.133 : 532.14 : 541.265

Viscosity at the boiling point. The rheochor. FRIEND, J. N., AND HARGREAVES, W. D. *Phil. Mag.*, 34, *pp.* 643–650, *Sept.*, 1943.—By substituting $\eta^{1/8}$ from Herz's equation $M\eta^{1/8}/D$ = const., for $\sigma^{1/4}$ in the parachor $M\sigma^{1/4}/D$, an expression $M\eta^{1/8}/D$ termed the rheochor (R) is obtained, and this is independent of temp. over the range in which the structure is unchanged. Variation of R with temp. and with the nature of the liquid is examined, and experimental and calculated values of R at different temps. for a number of liquids are reported. N. M. B.

2709 532.14 : 536.44

Aliphatic hydrocarbon densities. STEVENIN, T. G., AND ALLEN, J. G. *Industr. Engng Chem.*, 35, *pp.* 788–789, *July*, 1943.—A simplified correlation of densities of paraffin (and to some extent olefin) hydrocarbons is presented. Based on reduced temp. and reduced pressures, it gives densities directly without the use of intermediate reduced vol.

See Abstr. 2817 532.14 : 537.226.1

See Abstr. 2708 532.14 : 541.265 : 532.133

2710 532.516 : 621.89

Anomalous viscosity shown in oil flow through engine bearings. NEALE, S. M. *Phil. Mag.*, 34, *pp.* 577–588, *Sept.*, 1943.—It is shown that the usual assumption of proportionality betw. shearing stress and velocity gradient is incapable of explaining recent data on oil flow through engine bearings. It is suggested that, at high rates of shear, lubricating oils undergo molecular orientation, causing a large fall in viscosity.

2711 532.517 : 532.66

On H. Poncin's problem. SIRCAR, H. *Bull. Calcutta Math. Soc.*, 34, *pp.* 201–213, *Dec.*, 1942.—The author shows that the condition of initial equilibrium, assumed by Poncin, is impossible. The unsteady motion succeeding the initial steady motion is discussed; by means of an expansion, effected by means of Cauchy's calculus of residues, it is shown that no discontinuity appears at any time at any place in the tube. J. S. G. T.

See Abstr. 2730 532.542 : 534.132

2712 532.542.1

Flow of a compressible viscous fluid through a straight pipe. KUO, Y. H. *J. Math. Phys.*, 22, *pp.* 13–20, *May*, 1943.—The flow of compressible viscous fluid, under either isothermal or adiabatic conditions, through a straight pipe of any general const. section is discussed mathematically, with the *proviso* that the relevant Mach number, M (the ratio of the mean vel. of the fluid to that of sound in the fluid) is small. The equations of motion are expressed in terms of the momentum vector and sp. vol., and the solution for the flow is derived as a power series in terms of M; possible convergence or divergence of the series is not discussed. The zero approx. is the Hagen–Poiseuille motion; first and second approx. are reduced to Dirichlet's problem and the biharmonic problem with specified boundary conditions. The method of solution is illustrated by application to a pipe of const. circular cross-section, for which explicit solutions are obtained. J. S. G. T.

See Abstr. 2953 532.59 : 551.554

2713 532.61

The definition of surface tension. ANTONOFF, G. *J. Phys. Chem.*, 47, *pp.* 463–464, *June*, 1943.

2714 532.613.4 : 541.135.6

Pulsations on mercury surface caused by polarization. DOSS, K. S. G., AND RAO, B. S. *Proc. Indian Acad. Sci. A.*, 17, *pp.* 158–160, *May*, 1943.—If an iron wire is brought into contact with the surface of mercury, kept under a dilute solution of H_2SO_4 containing a little $K_2Cr_2O_7$, the mercury begins to pulsate—a phenomenon which has been designated as the mercury heart. The phenomenon is due to the iron contact changing the polarization of the mercury surface from anodic to cathodic, resulting in a rise of the interfacial tension, with a consequent contraction of the mercury drop. The conditions become cyclic, leading to pulsations of the drop. It is possible to produce these pulsations by using other means.

A. E. T.

2715 532.62 : 541.183

A new adsorption isotherm which is valid over a very wide range of pressure. JURA, G., AND HARKINS, W. D. *J. Chem. Phys.*, 11, *pp.* 430–431, *Sept.*, 1943.

2716 532.62 : 541.183

An adsorption method for the determination of the area of a solid without the assumption of a molecular area, and the area occupied by nitrogen molecules on the surfaces of solids. HARKINS, W. D., AND JURA, G. *J. Chem. Phys.*, 11, *pp.* 431–432, *Sept.*, 1943.

2717 532.64

On contact angles. IRONS, E. J. *Phil. Mag.*, 34, *pp.* 614-624, *Sept.*, 1943.—The theory of a capillary-tube method for the determination of a contact angle betw. a liquid and a solid is considered in detail, and the results of observations on the receding angles made by 6 different liquids on 6 different metals and by a number of liquids on glass are reported. The results indicate that, to a few parts in a thousand, the cosines of the angles are all 1.

See Abstr. 2711 532.66 : 532.517

See Abstr. 2858 532.685 : 533.15 : 539.217

2718 532.7 : 62

Modern liquid-state theory in relation to engineering. SILVER, R. S. *Engineering*, 156, *pp.* 64–65, *July* 23, *and pp.* 114–115, *Aug.* 6, 1943.—A summary of lines of thought developed up to the present on surface tension, cohesion, the van der Waals equation, X-ray investigations of liquid structure showing the presence of ordered groups as an average result of fluctuating atomic motions, and theories of the type of order, with sp. ref. to the structure of water, distinguishing the chemical ideas of mono-, di-, and tri-hydrol from the water I, II, III concept of arrangements of a tetrahedral group of four H_2O mols. Developments of the order-disorder arrangement theory by various investigators, and the Fürth theory of "holes," are reviewed with ref. to allied theory of solids. N. M. B.

2719 532.739 : 541.123.21

The system: silver-nitrate–water. CAMPBELL, A. N., AND BOYD, M. L. *Canad. J. Res. B*, 21, *pp.* 163–169, *Aug.*, 1943.—The temp./conc. diagram was determined from 0 to 100% $AgNO_3$, with great accuracy. The equilibrium curve exhibits a eutectic point at $-7{\cdot}57$°C. and 46·9% and a break at 159° where solid $AgNO_3$ passes from the rhombic to the rhombohedral form.

2720 532.739.2

The effect of gelatin on the solubility of thallous salts at 40°C. EVERSOLE, W. G., AND THOMAS, F. S. *J. Phys. Chem.*, 47, *pp.* 421–424, *June*, 1943.—The addition of gelatin increases the solvent power of water for thallous salts. The percentage increase depends on the conc. of the gelatin and the position of the saturating salt in the lyotropic series. The electrical condition of the gelatin is of secondary importance.

2721 533.15

A note on the elementary theory of thermal diffusion. RAI, R. N., AND KOTHARI, D. S. *Indian J. Phys.*, 17, *pp.* 103–106, *April*, 1943.—An elementary derivation of the coefficient of thermal diffusion and its change of sign with concentration is discussed. The results have been compared with the experimental results of Grew. [Abstr. 85 (1943)].

See Abstr. 2858 533.15 : 532.685 : 539.217

See Abstr. 2862 533.15 : 539.217.5

2722 533.16 : 536.423.1

Boiling point and viscosity of gases. DUTTA, A. *Nature, Lond.*, 152, *pp.* 445–446, *Oct.* 16, 1943.

2723 533.21 : 541.122.4.011.4

Phase equilibria in hydrocarbon systems: volumetric behaviour of methane. OLDS, R. H., REAMER, H. H., SAGE, B. H., AND LACEY, W. N. *Industr. Engng Chem.*, 35, *pp.* 922–924, *Aug.*, 1943.—The volumetric behaviour of CH_4 was investigated at pressures up to 10 000 lb./in.^{2} at 100°–460°F.

2724 533.275 : 551.508.71

Notes on some recent developments in hygrometry. AWBERY, J. H. *J. Sci. Instrum.*, 20, *pp.* 153–154, *Oct.*, 1943.

2725 533.42 : 551.508.41

Simple and accurate formula for barometric corrections. CINTRO DO PRADO, LA. *Rev. Sci. Instrum.* 14, *pp.* 221–222, *July*, 1943.

See Abstr. 2690 533.5 : 53.084.837

2726 533.6

Physics and rapid airplane development. LUNDQUIST, E. C. *Amer. J. Phys.*, 11, *pp.* 192–199, *Aug.* 1943.—Discusses some parameters rel. to aircraft performance, mentions the part experiment has played in development, and indicates the function of some modern mechanical devices that contribute to superior performance.

2727 533.6.08 : 621.317.39

Measurement of high air velocities by the hot-wire method. WESKE, J. R. *Techn. Not. Nat. Adv. Comm. Aero., Wash., No.* 880, *Feb.*, 1943.—[Abstr. 2221 B (1943)].

2728 533.6.08 : 621.317.39

A hot-wire circuit with very small time lag. WESKE, J. R. *Techn. Not. Nat. Adv. Comm. Aero., Wash. No.* 881, *Feb.*, 1943.—[Abstr. 2222 B (1943)].

SOUND. VIBRATIONS.

2729 534 : 621.392.4

A general reactance theorem for electrical, mechanical, and acoustical systems. DAH-YOU MAA. *Proc*

nst. Radio Engrs, N.Y., 31, *pp.* 365–371, *July*, 1943.—Abstr. 2518 B (1943)].

2730 534.132 : 532.542

The damping of large-amplitude vibrations of a fluid in a pipe. BINDER, R. C. *J. Acoust. Soc. Amer.*, 15, *pp.* 41–43, *July*, 1943.—In the motion of fluids in rigid cylindrical pipes the Helmholtz–Kirchhoff damping theory gives very low values of the damping factors for large pressure amplitudes. Murphree has shown that the eddy viscosity increases with Reynolds's number, and the author adds this viscosity to the dynamic viscosity, and after dividing the modified formula by 2π, the new damping factor gives fair agreement with the available experimental data [see Abstr. 2662 (1935)]. G. E. A.

2731 534.142

Reverberation in small glass tubes. COX, S. M. *Nature, Lond.*, 152, *pp.* 357–358, *Sept.* 25, 1943.

2732 534.143 : 621.396.615.1

An automatic frequency-controlled oscillator and amplifier for driving mechanical vibrators. POTTER, E. V. *Rev. Sci. Instrum.*, 14, *pp.* 207–215, *July*, 1943.—[Abstr. 2527 B (1943)].

2733 534.15

A method for measuring amplitudes of vibration of rotating shafts. MITCHELL, J. A. *J. Sci. Instrum.*, 20, *p.* 134, *Aug.*, 1943.—A c.r.o. is used with a resistance-type pressure element held against the rotating shaft at the point required by means of a rigidly held cantilever. Calibration of amplitude is carried out with a known excentric cam. E. H. W. B.

2734 534.154 : 621.385.8

Electronic apparatus for vibration testing. FEHR, R. O., AND SHABTACH, C. *Electronics*, 16, *pp.* 94–96, *June*, 1943.—[Abstr. 2248 B (1943)].

See Abstr. 2741, 2742 534.22.093.2 : 534.321.9

2735 534.22.093.3 : 534.321.9

Propagation of elastic waves through electrolytic solutions. DUTTA, A. K., AND GHOSH, B. B. *Indian J. Phys.*, 17, *pp.* 19–25, *Feb.*, 1943.—Heavy alkali halides show at first a decrease of velocity with concentration and then an increase of velocity. This effect is enhanced at higher temperatures. The behaviour is opposite to that of other electrolytes; the compressibility/conc. curve is closely related to the viscosity/conc. curve.

2736 534.232 : 621.395.623.7

Conditions for wide-angle radiation from conical sound radiators. CARLISLE, R. W. *J. Acoust. Soc. Amer.*, 15, *pp.* 44–49, *July*, 1943.—The loud-speaker cone is approximated to an array of pairs of point sources and conditions of wide-angle radiation depend on the selection of the cone angle, the number and depth of the corrugations, and the weight and stiffness of the cone material. G. E. A.

2737 534.32 : 786.2

Observations on the vibrations of piano strings. SCHUCK, O. H., AND YOUNG, R. W. *J. Acoust. Soc. Amer.*, 15, *pp.* 1–11, *July*, 1943.—The behaviour of single strings struck in their normal positions was investigated through measurement of the frequencies of the partials and their amplitudes as functions of time after striking. The frequencies of the partials of the tone were those of the normal modes of vibration. The higher modal frequencies are progressively sharp with resp. to true harmonics of the fundamental; the sharpening follows approx. a square law with resp. to mode number. A correlation betw. inharmonicity and subjective tone quality rating is suggested.

2738 534.321.33

The problem of the keyboard instrument. II. LLOYD, L. S. *Phil. Mag.*, 34, *pp.* 624–631, *Sept.*, 1943.—[See Abstr. 2538 (1943)]. The paper includes an account of the objective and nature of the temperament devised for the harpsicord. This was intended to replace mean-tone temperament and to provide a better approximation to the musical scale embodied in various keys, particularly that of Corelli. H. H. HO.

2739 534.321.33 : 786

Mean-tone temperament. The classical system of instrumental tuning. WHITE, W. B. *J. Acoust. Soc. Amer.*, 15, *pp.* 12–16, *July*, 1943.

2740 534.321.5

Relation between dissonance and context. GARDNER, P. A. D., AND PICKFORD, R. W. *Nature, Lond.*, 152, *p.* 358, *Sept.* 25, 1943.

2741 534.321.9 : 534.22.093.2

Supersonic measurements in CO_2 and H_2O at 98°C. PIELEMEIER, W. H., AND BYERS, W. H. *J. Acoust. Soc. Amer.*, 15, *pp.* 17–21, *July*, 1943.—Following a previous method [Abstr. 834 (1940)] the velocity and absorption were measured in CO_2 containing water vapour at 98°C. The apparent change in relaxation times from 28° to 98° was not entirely as expected, and the minor absorption peaks were not rendered more prominent. The spec. ht. of CO_2 calculated from the results agrees with the values obtained from spectroscopic data and with reliable calorimetric results. G. E. A.

2742 534.321.9 : 534.22.093.2

Supersonic measurements in CO_2 at 0° to 100°C. PIELEMEIER, W. H. *J. Acoust. Soc. Amer.*, 15, *pp.* 22–26, *July*, 1943.—An attempt to harmonize the best data on the velocity and absorption of l.f. and h.f. sound waves in CO_2. Velocity/temp. graphs are drawn, also curves to show how the frequency for max. absorption per wavelength depends on the water vapour conc. in the CO_2 at 1 atm. pressure. Two distinct relaxation times are indicated for each conc., and acetaldehyde is cited as a gas in which 3 relaxation times have been found. G. E. A.

See Abstr. 2735 534.321.9 : 534.22.093.3

See Abstr. 2810 534.321.9 : 536.633

2743 534.41.07 : 621.317.76

Recording audio analyser. *Electronics*, 16, *pp.* 100–103 *and* 210, *July*, 1943.—[Abstr. 2462 B (1943)].

2744 534.632 : 621.317.755

A simple method of measuring the wavelength of sound in free air. KNOWLES, E. G. *J. Sci. Instrum.*, 20, *p.* 165, *Oct.*, 1943.

2745 534.641 : 621.317.39

Mechanical impedance bridge. WIGGINS, A. M. *J. Acoust. Soc. Amer.*, 15, *pp.* 50–53, *July*, 1943.—A bridge for measuring the mechanical impedance of a phonograph pick-up, and other vibrators, for frequencies from 30 to 10 000 is described. An essential part of the driving mechanism is a double reed with

central node or clamp, driven at the clamp by an alternating force, the 2 free ends having equal compliances (bend per unit force). When one reed is loaded with a mechanical impedance at its free end the relative displacement of the ends is no longer zero but is ∝ the driving force, the effective masses and compliances of the reeds, and the impedance of the load. The theory, construction and operation of the bridge are given. G. E. A.

2746 534.75 : 612.85

Direct observations of the acoustic oscillations of the human ear. KOBRAK, H. G. *J. Acoust. Soc. Amer.*, 15, *pp.* 54–56, *July*, 1943.—Light is passed into the outer ear canal, parallel to its walls, by means of a concave mirror with a central hole, and is reflected by the eardrum to a camera. A short hollow cylinder has a funnel to receive the sound, another to convey the sound into the ear, and at the back a lens for magnification. The stroboscopic method of illumination is used and direct observation and photographic recording of the vibrations of the tympanum are employed. G. E. A.

2747 534.75 : 612.85

Is the threshold audiogram sufficient for determining hearing capacity? FOWLER, E. P. *J. Acoust. Soc. Amer.*, 15, *pp.* 57–60, *July*, 1943.—The threshold audiogram determines what a person cannot hear, but is not sufficient to determine how much he can hear. It does not reveal the recruitment and blurring phenomena nor the binaural and monaural deafness for words. The author suggests a general method based on experience for estimating the overall loss of hearing for speech. [See Abstr. 2295 (1942)]. G. E. A.

2748 534.835

The application of sound absorption to factory noise problems. SABINE, H. J., AND WILSON, R. A. *J. Acoust. Soc. Amer.*, 15, *pp.* 27–31, *July*, 1943.—Noise-level measurements in 33 plants of diverse nature varied betw. 65 and 130 db, and in the majority from 85 to 105 db. Factors other than noise level contribute to the discomfort of the worker, namely reverberation and the spreading-effect of sound or the tendency of sound in a non-absorbent room to decrease at a slow rate with increasing distance from the source. Further, a machine operator is affected less by the sound of his own machine than by others near him. Conditions favourable to improvement are: wide spacing of machines, differing qualities of noise from various units, and intermittent operation of the machines. In rooms whose smallest floor dimension is at least several times the ceiling height and having a sound-absorbent ceiling (coeff. at least 0·7), the intensity level due to one or more sources decreases at a const. rate over the entire area of the room. This rate varies inversely with the ceiling ht. and may be 0·2 to 0·4 db/ft. G. E. A.

2749 534.851

Record tracking. *Wireless World*, 49, *pp.* 260–262, *Sept.*, 1943.—Review of a paper by Beers and Sennett on a miniature variable-capacity pick-up. It appears desirable to use a stylus radius of about 0·003 in. The conditions for tracking a laterally cut record are expressed mathematically to give the min. vertical force on the stylus which will ensure proper tracking. A tracking weight characteristic of the pick-up is given when normally operated with a tracking weight of 18 g. A pinch effect arises from the use of a chisel-shaped stylus for cutting commercial record masters. The stylus vibrates with its flat forward face at rt. angles to the axis of the groove. As a consequence, the faster the stylus moves sideways the narrower the groove, and the needle will take on a vertical movement with double the frequency of that of the record. Vibrational impedance to vertical motion is therefore kept low. Technical details are given of the working of the system, and it is added that the surface noise from these records was not objectionable. G. E. A.

OPTICS

See Abstr. 2660 535.1 : 517.65(083.5)

2750 535.14 : 536.7

Application of photon statistics to the specific heat of a monatomic solid. BISWAS, B. N. *Indian J. Phys.*, 17, *pp.* 1–5, *Feb.*, 1943.—The statistics of photons is applied to derive an expression for the sp. ht. of a monatomic solid, the molecules of which are endowed with 3 deg. of freedom. The expression is similar to Debye's expression. The entropy and free energy of the solid are also worked out.

See Abstr. 2834 535.14 : 537.591.1

2751 535.24

Photometrics in general physics. MOON, P., AND SPENCER, D. E. *Amer. J. Phys.*, 11, *pp.* 200–208, *Aug.*, 1943.—The treatment of photometry in physics text-books is usually out of date and unrelated to the rest of physics. The authors point out common defects and suggest lines along which improvement could readily be effected. J. W. T. W.

2752 535.241

Study on measurements of daylight: the influence of polarized light. HAUSNER, H. H. *Illum. Engng, N.Y.*, 38, *pp.* 382–390, *July*, 1943.—Selenium rectifier photocells are frequently used for measuring daylight factors in a building. The light from different parts of the sky is variously polarized; the results of measurements of the effect of polarization on the response of a photocell are given. The daylight factor is defined as the ratio of internal illumination to the illumination from ½ hemisphere of sky. J. W. T. W.

2753 535.241 : 628.9

The duple. DUFTON, A. F. *Phil. Mag.*, 34, *pp.* 607–608, *Sept.*, 1943.—[See Abstr. 1598 B (1943)].

2754 535.243

Some uses of the direct-intensity microphotometer. WILLIAMS, R. C., AND HILTNER, W. A. *Astrophys. J.*, 98, *pp.* 43–48, *July*, 1943.—Gives a brief description of a recording microphotometer [*Publ. Obs. Univ. Michigan*, 8, 45, 1940] and shows how it can be adapted for use as a transmission microphotometer or for tracing isophot curves on a negative of, for example, a nebula or the sun's corona. The instrument has now been improved so that its sensitivity is better than 1% of the continuum of absorption spectra for all plate densities betw. 2·0 and 0·1. J. W. T. W.

See Abstr. 2682 535.243 : 523.872

2755 535.243 : 535.81

Some spectrophotometric investigations on iron-containing soda-lime-silica glasses. II. The effect of arsenic and antimony oxides. WANG, T. H., AND TURNER, W. E. S. *J. Soc. Glass Technol.*, 27, *pp.* 60*T*–76*T*, *April*, 1943.—[See Abstr. 1921 (1943)]. Glasses, based on that of parent composition 75% SiO_2, 10% CaO and 15% Na_2O, containing varying amounts of Fe oxide and of As oxides, were melted at 1 400° for 6 hr. in Pt in a gas-fired furnace after pre-sintering of the mixture at 750°. The effect of As as a decolorizer appeared to be twofold: its oxidizing effect shifted the ferrous-ferric equilibrium towards the ferric state, and its presence caused some Fe to form a colourless product. Similar experiments using Sb_2O_3 reproduced those results.

2756 535.247.4

Photo-electric photometer. CUNLIFFE, P. W. *J. Text. Inst., Manchr*, 34, *T55–T60*, *Aug.*, 1943.—Describes a simple form of absorptiometer using an emission photocell and the valve potentiometer portion of a glass-electrode *p*H meter. J. W. T. W.

2757 535.247.4 : 537.531 : 535.4

Recording microphotometer for the examination of X-ray diffraction films. RONNEBECK, H. R. *J. Sci. Instrum.*, 20, *pp.* 154–161, *Oct.*, 1943.—Describes a recording microphotometer using a KMV 6 photocell with 2-stage amplification, the lens system consisting of two old cinema sound heads. Recording takes place at a film speed of about 3 cm./min.

J. W. T. W.

2758 535.247.4 : 621.383.2

Photo-electric photometers: their properties, use and maintenance. PRESTON, J. S. *Trans. Illum. Engng Soc., Lond.*, 8, *pp.* 121–152, *July*, 1943.—Deals with the problems arising in the application of emission cells and rectifier cells in photometry, particularly the correction of the results to accord with the std. eye. Life, stability, fatigue, temperature coeff., dark current, effect of obliquity of incident light and linearity of response, are discussed in rel. to each type of cell. The circuits commonly used are described and details are given of a portable emission-cell photometer, with amplifier circuit, capable of measuring down to 10^{-9} lumen or 2×10^{-6} f.c. J. W. T. W.

See Abstr. 2829 535.3 : 537.531

2759 535.31

Notes on refraction at a plane interface and by a (triangular) prism. IRONS, E. J. *Phil. Mag.*, 34, *pp.* 608–614, *Sept.*, 1943.—Gives some geometrical constructions for evaluating refr. index, and deviation produced by a prism, and for proving min. deviation property of a prism.

2760 535.317

Ray-tracing through non-spherical surfaces. BAKER, T. Y. *Proc. Phys. Soc., Lond.*, 55, *pp.* 361–364, *Sept.*, 1943.—A discussion of some of the factors involved in ray-tracing through surfaces obtained by rotating conics around their principal axes. A. H.

2761 535.324

The refractive indices of hydrogen peroxide and its aqueous solutions. GIGUÈRE, P. A. *Canad. J. Res. B*, 21, *pp.* 156–162, *Aug.*, 1943.—The refr. indices of aq. solutions of H_2O_2 for the *C*-, *F*- and *G*-lines of H and the Na *D*-line were measured over the whole range of conc. at 16°, 20°, 24° and 28°C. The results are different from those of Cuthbertson and Maass [Abstr. 2616 (1930)]. An explanation is given. By extrapolation it was found that for pure H_2O_2 $n_D = 1{\cdot}4087$ at 20°. The refr. index affords a rapid method for determining the conc.

2762 535.33

A briquetting press and electrode loader for spectrochemical analysis. HARRISON, H. C., AND RALPH, C. C. *Industr. Engng Chem.* (*Analyt. Edit.*), 15, *pp.* 466–467, *July* 15, 1943.—An easily constructed apparatus is described, for briquetting a powdered sample for spectrographic analysis and loading the briquet into an electrode crater without manual handling.

See Abstr. 2780 535.332 : 535.376

2763 535.338

A continuum in the 1 849 Å region in the afterglow spectrum of mercury. WATTENBERG, A., AND WEBB, H. W. *Phys. Rev.*, 64, *pp.* 39–40, *July* 1 *and* 15, 1943.—[See Abstr. 2328 (1941)].

See Abstr. 2830 535.338 : 537.531

2764 535.338.3 : 77

The use of iron lines as intensity standards. DIEKE, G. H., AND CROSSWHITE, H. M. *J. Opt. Soc. Amer.*, 33, *pp.* 425–434, *Aug.*, 1943.—Groups of Fe lines with rel. intensities independent of excitation are proposed as standards for plate calibration. One group betw. 3 140 and 3 240 Å has been tested under a variety of conditions and found satisfactory. A study of self-reversal was made which allows an estimate of the degree of self-reversal of any line under given conditions.

2765 535.338.4

Continuous emission bands in the spectrum of CCl_4. ASUNDI, R. K., SINGH, N. L., AND MISHRA, J. P. *Curr. Sci.*, 12, *pp.* 204–205, *July*, 1943.

2766 535.338.4-31

The ultra-violet absorption spectrum of formic acid. SUGARMAN, B. *Proc. Phys. Soc., Lond.*, 55, *pp.* 429–430, *Sept.*, 1943.—The absorption bands at room temp. betw. 2 260 and 2 600 Å were observed to follow the formula $1/\lambda = 37\,754 + 1\,033(v_1 + \frac{1}{2}) + 385(v_2 + \frac{1}{2})$.

2767 535.338.42

Experimental study of the intensity theories in band spectra. I. Hutchisson's theory. II. Langstroth's theory. TAWDE, N. R., AND PATANKAR, V. S. *Proc. Phys. Soc., Lond.*, 55, *pp.* 396–409, *Sept.*, 1943.—The 2nd positive N_2 system is used for this study, integrated intensity values being determined by photographic photometry. Transition probabilities are calculated from known mol. const. with the help of Hutchisson's formula. Observed I/ν^4 values (I = integrated intensity) are compared with calculated emission-probabilities and the agreement is unsatisfactory—it is improved by interchanging vibnl. quantum numbers. Factors responsible for the lack of agreement are discussed. The complete intensities are calculated as suggested by Langstroth and these are compared with the I/ν^4 values. Again the agreement is not satisfactory, as had previously been concluded by Langstroth using peak values for the same

system. Reasons for the lack of agreement are discussed. A. H.

2768 535.338.42

Intensity anomalies and perturbations in the CN bands. WAGER, A. T. *Phys. Rev.*, 64, *pp.* 18–31, *July* 1 *and* 15, 1943.—The rotational structures of the 0,0 violet and the 9,4 red CN bands, developed by $CHCl_3$ in active N, are measured on plates from the first and second orders of a 30 ft. grating. The rot. constants of the $b^2\Sigma, v = 0$ and the $a^2\Sigma, v = 4$ states agree with previously published values [Abstr. 591 (1930)]. Four perturbations are found at $K = 4, 7, 11$ and 15 for $b^2\Sigma$; extra P and R lines appear in both the 0,0 and 0,1 bands of the violet system. In the red system, shifts of the right amount and direction confirm the assumption that rot. levels of $^2\Pi, v = 9$, perturb those of $b^2\Sigma, v = 0$. The values of the perturbation matrix elements are obtained for the various levels. Some anomalies of the R branch band lines are mentioned. The mechanism responsible for the enhancements of the main and extra lines of the 0,0 violet band is discussed.

2769 535.338.42 : 539.152.2

Determination of the nuclear spin of Cl^{37}. SHRADER, E. F. *Phys. Rev.*, 64, *pp.* 57–59, *Aug.* 1 *and* 15, 1943.—The nuclear spin of the Cl atom was determined by observing the line intensities in the band spectrum of the homonuclear diatomic molecule. The intensity ratio lines of even J values to those of odd J values is $(I + 1)/I$, where I is the nuclear spin of the atom. In the band absorption spectrum of Cl the intensity ratio of lines of $Cl^{35}Cl^{35}$ was measured and compared with the value found by Elliott [Abstr. 3719 (1930)]. These values agree and yield 5/2 for the nuclear spin of Cl^{35}. By thermal diffusion, 200 cm.^{3}, S.T.P., of Cl gas was obtained containing 45% Cl^{37}. The absorption spectrum showed lines of $Cl^{37}Cl^{37}$ in the $1 \rightarrow 12$ band of the $^1\Sigma \rightarrow {}^+0$ band system of Cl_2. The intensity ratio for $Cl^{37}Cl^{37}$ was the same as for $Cl^{35}Cl^{35}$, indicating that the nuclear spin of Cl^{37} is also 5/2.

2770 535.339.2 : 621-716

A method of cooling hydrogen discharge tubes. HSUEH CHAO-WANG. *Rev. Sci. Instrum.*, 14, *pp.* 250–253, *Aug.*, 1943.—Experiments are described on cooling by means of rapidly evaporated liquid air. The temperatures were measured with a calibrated Cu constantan thermocouple. Special apparatus was constructed to determine the f.p. of the substances used for calibration. Cooling of the light source to 56°K. is obtained at low cost. M.-V.

2771 535.341-31 : 667.2

On the ultra-violet absorption of the dyestuffs in solution and the influence of neutral salts on the same. CHOWDHURY, K., AND BOSE, C. *Indian J. Phys.*, 17, *pp.* 43–49, *Feb.*, 1943.—The paper deals with succinyl eosin, pinakryptol yellow in glycerine, acriflavine in alcohol, pinaflavol in alcohol, aniline orange in alcohol, "rose Bengal" in alcohol, pinakryptol green in alcohol, succinyl fluorescein in glycerine. The absorption curves for each of these are given. The effect of quenching (KI) was studied for acriflavine, succinyl fluorescein and pinakryptol yellow.

2772 535.343-1 : 535.375.51

Infra-red and Raman spectra of polyatomic molecules. XVIII. Trideuteronitromethane. WILSON, T. P. *J. Chem. Phys.*, 11, *pp.* 361–368, *Aug.*, 1943.—[See Abstr. 851 (1943)]. The infra-red spectrum was studied in the range 3–25 μ, and the Raman spectrum analysed. All fundamental frequencies except that of the torsion about the C–N bond, were determined [see Abstr. 1290 (1941)] and a potential function fitting the observed frequencies of nitromethane and trideuteronitromethane within 2% was obtained.

2773 535.343-1 : 535.375.51

Infra-red and Raman spectra of polyatomic molecules. XX. Cyclobutane. WILSON, T. P. *J. Chem. Phys.*, 11, *pp.* 369–378, *Aug.*, 1943.—[See Abstr. 2175 (1943)]. The infra-red spectrum in the range 2 to 25 μ was obtained, together with the Raman spectrum of the same material. Analysis led to a tentative assignment of the fundamentals which explains all features of the observed spectra. Butene-1 has been identified as a product of the liquid phase photolysis of cyclopentanone.

2774 535.343-31

The absorption spectra of some *m*-substituted phenols, and the influence of nucleophilic substituents on electronic mobility. HODGSON, H. H. *J. Chem. Soc.*, *pp.* 380–382, *Aug.*, 1943.—The ultra-violet absorption spectra of phenol and of 8 *m*-substituted phenols have been measured in aq. neutral, acid and alkaline solution. The substituents were all *op*-directing, i.e. electron-repelling, and their considerable effects on the electronic mobility are compared.

2775 535.37

The chemical and physical properties of luminescent materials. STRANGE, J. W. *Proc. Phys. Soc., Lond.*, 55, *pp.* 364–371, *Sept.*, 1943.—A survey article which, after a preliminary examination of the field, concentrates on the phenomenon in inorganic solids and the mechanism of the effect. A. H.

2776 535.371

Fluorescence of organic molecules. WEISS, J. *Nature, Lond.*, 152, *pp.* 176–178, *Aug.* 14, 1943.—The mechanism of light absorption by mols. is discussed, and the reactions involved in quenching are detailed. The presence of loosely bound electrons is apparently a necessary condition for fluorescence. All org. mols. showing appreciable fluorescence in the visible or near ultra-violet have a conjugated system of double bonds. A. J. M.

2777 535.371

The effect of oxygen on the fluorescence of certain hydrocarbons. MILLER, J. A., AND BAUMANN, C. A. *J. Amer. Chem. Soc.*, 65, *pp.* 1540–1546, *Aug.*, 1943.—The intensity of fluorescence was measured for 3,4-benzpyrene, 20-methylcholanthrene, 9,10-dimethyl-1,2-benzanthracene, 1,2,5,6-dibenzanthracene, 1,2-benzanthracene and anthracene, each in several solvents in air and *in vacuo*. Various inhibitors were tested and the conditions of reversibility established.

2778 535.371 : 535.668 : 667.5 : 774

"Kodak" fluorescence process of automatic colour correction. COPPIN, F. W. *Proc. Phys. Soc., Lond.*, 55, *pp.* 371–375, Sept., 1943.—Describes a simple method of automatically obtaining colour correction during the actual process of making separation negatives. This is done by inclusion in special water colour paints of materials which fluoresce under ultra-violet radiation but which do not alter the pain

appearance under ordinary conditions. Full details of the method of using these special paints are given. A. H.

2779 535.375.51

Raman spectra of *l*-ascorbic acid, tetronic acid and related compounds. EDSALL, J. T., AND SAGALL, E. L. *J. Amer. Chem. Soc.*, 65, 1312–1316, *July*, 1943.—The Raman spectra of 3 ascorbic acids, of tetronic and α-nitrotetronic acids, and of phenol, were studied in aq. solution. The spectra of the Na salts of these compounds were also determined. All these substances yield intense Raman spectra. All the undissociated ascorbic acids show an intense Raman line near 1 700 cm.$^{-1}$, which is shifted to about 1 595 cm.$^{-1}$ on ionization. This change is characteristic of the ring structure in ascorbic acids. α-nitrotetronic acid and phenol show no appreciable change in the Raman spectrum on ionization.

See Abstr. 2772, 2773 535.375.51 : 535.343-1

2780 535.376 : 535.332

Spectrum of active nitrogen in the Schumann region. ANAND, B. M., KALIA, P. N., AND RAM, M. *Indian J. Phys.*, 17, *pp.* 69–78, *April*, 1943.—A review of the theories of active N_2 is given. Experiments on the emission and absorption spectrum of the afterglow in the Schumann region with a 1 m. normal-incidence vacuum spectrograph are described. Spectroscopic evidence supports the theory of the molecular nature of the phenomenon.

See Abstr. 2757 535.4 : 537.531 : 535.247.4

2781 535.412

New contributions to interferometry. I. New non-localized interference fringes. TOLANSKY, S. *Phil. Mag.*, 34, *pp.* 555–565, *Aug.*, 1943.—New non-localized interference fringes, produced with a small source and a Fabry–Perot interferometer, are described. These extend into space in the form of cones, producing sharp rings when allowed to fall upon a screen. The properties of these rings are examined. Without lenses, sharp rings of great dia. can be produced. Complex patterns are produced with various slit sources. Possible applications of the new fringes are considered.

2782 535.434

On the transmission of light through a cloud of randomly distributed particles. RAMACHANDRAN, G. N. *Proc. Indian Acad. Sci. A*, 17, *pp.* 171–186, *June*, 1943.—The phenomenon is theoretically investigated on the basis of wave optics. The cases of both transparent and of opaque particles are considered; the transmitted beam is progressively attenuated, exponentially with the increase in the thickness of the medium. The actual values of the attenuation coefficient are calculated in both cases. For an opaque particle, the diminution of intensity in the forward direction is double what would be expected from simple geometric considerations. For transparent particles, the transmitted intensity shows spectral variations, and this explains the colours shown by the transmitted light, and the complementary nature of this colour and the colour of the light scattered by the cloud in the forward direction.

2783 535.551 : 539.379 : 679.56

Photo-elastic investigations of structural changes in plastic materials. KOLSKY, H., AND SHEARMAN, A. C. *Proc. Phys. Soc., Lond.*, 55, *pp.* 383–395, *Sept.*, 1943.—The orientation and structural changes in polythene, nylon, methyl methacrylate polymer and polystyrene, resulting from the application of known stresses, are investigated by measurements of optical anisotropy. The mechanism of cold-drawing in the case of polythene and nylon is considered in detail and the birefringence correlated with the mechanical strain. The anomalous birefringence of polystyrene and methyl methacrylate is attributed to the orientation of side groups. Investigations of the dependence of structural changes on temperature are described.

See Abstr. 2898 535.56 : 541.132

2784 535.56 : 541.653

Optical rotation and atomic dimension: the four optically active 2-halogenopentanes. BRAUNS, D. H. *J. Res. Nat. Bur. Stand., Wash.*, 31, *pp.* 83–106, *Aug.*, 1943.—Differences of sp. rotations, (Cl-F), (Br-Cl) and (I-Br), have the same numerical relation as the respective differences of the radii of the covalent-bonded atoms (41 : 17 : 21) [Abstr. 1621 (1937)]. The paper reports results obtained in checking this rule with the halogen derivatives of pentanol-2. Pure optically active *D*- and *L*-pentanol-2 were prepared and halogenated by different methods in order to obtain the 2-fluoro-, 2-chloro-, 2-bromo- and 2-iodo-pentanes of highest rotation. The deviations can be plausibly explained by the incompleteness of the Walden inversion. All halogen derivatives of pentanol-2 of like configuration have the same sign of optical rotation. The sp. gravity, refr. index and b.p. at various pressures were determined.

2785 535.653.8

A psychological colour solid. NICKERSON, D., AND NEWHALL, S. M. *J. Opt. Soc. Amer.*, 33, *pp.* 419–422, *July*, 1943.—Describes the colour solid which can be constructed on the basis of the smoothed Munsell colour scale defined [Abstr. 2788 (1943)]. An estimate of the total number of perceptibly different colours can be deduced. This is 7 500 000 under the best observational conditions or a quarter of this number under usual conditions of visual colour matching. J. W. T. W.

2786 535.653.85

Tristimulus specification of the Munsell book of colour from spectrophotometric measurements. KELLY, K. L., GIBSON, K. S., AND NICKERSON, D. *J. Opt. Soc. Amer.*, 33, *pp.* 355–376, *July*, 1943. *J. Res. Nat. Bur. Stand., Wash.*, 31, *pp.* 55–76, *Sept.*, 1943.—Gives a specification in fundamental terms for the 421 master standards of the Munsell Book of Colour. A description of the method of measurement and of computation is given and the results are presented in tables showing the tristimulus specifications on the C.I.E. system for all the standards, under the 4 illuminants A, C, D and S (extremely blue sky). The trilinear co-ordinates have also been plotted on large chromaticity diagrams. J. W. T. W.

2787 535.653.85

Trichromatic specifications for intermediate and special colours of the Munsell system. GRANVILLE, W. C., NICKERSON, D., AND FOSS, C. E. *J. Opt. Soc. Amer.*, 33, *pp.* 376–385, *July*, 1943.—Gives tables showing the tristimulus values and the trilinear co-ordinates on the C.I.E. system for 561 samples of

Munsell colours intermediate and additional to the 421 samples of the std. series. The values given are for Illuminant C. J. W. T. W.

2788 535.653.85

Final report of the O.S.A. Sub-committee on the spacing of the Munsell Colours. NEWHALL, S. M., NICKERSON, D., AND JUDD, D. B. *J. Opt. Soc. Amer.*, 33, *pp.* 385–418, *July*, 1943.—Gives a complete specification for a Munsell colour solid by which the ideals of psychological equispacing and precise definition can be achieved. By means of the tables and curves given in the Report, the notation on this Munsell solid can be at once obtained from the C.I.E. Specification for any colour or, alternatively, the C.I.E. data can be found for any colour on the Munsell solid. J. W. T. W.

2789 535.66 : 591.111.2

Colour of red blood corpuscles. BAKER, J. R. *Nature, Lond.*, 152, *p.* 331, *Sept.* 18, 1943.

See Abstr. 2778 535.668 : 667.5 : 774 : 535.371

2790 535.7

Current problems in visual function and visual perception. BARTLETT, F. C. *Proc. Phys. Soc., Lond.*, 55, *pp.* 417–425, *Sept.*, 1943.—A discussion (13th Thomas Young Oration) of 3 visual problems: the predominantly peripheral mechanism of the single sense, the concurrent excitation of the visual and other sensorial functions, the rel. of both of these to visual perception. A. H.

2791 535.7

Studies on peripheral visual acuity. LOW, F. N. *Science*, 97, *pp.* 586–587, *June* 25, 1943.—The author has made measurements of the peripheral visual acuity of numbers of observers, using a Landolt broken-circle test. Nine points on each eye 30°, 60° and 90° from the line of vision were tested. There was no accurate correlation with age, sex, central acuity or colour vision. There was great spontaneous variability, unsuspected by the observer. The possibility of improvement by training was indicated. J. W. T. W.

2792 535.7 : 612.84

Specification of foveal adaptation. MOON, P., AND SPENCER, D. E. *J. Opt. Soc. Amer.*, 33, *pp.* 444–456, *Aug.*, 1943.—Examines the effect of the proved additivity of a number of glare sources in the field of view. The effect on foveal adaptation of an extended bright surround of various sizes is calculated and it is shown that the foveal adaptation produced by a completely uniform field is caused by the portion of the field that is imaged on the fovea, the surround contributing $< 10\%$ of the total. Colour adaptation is dealt with analytically. The effect of eye movements is considered; involuntary movements are of such small amplitude that their effect on foveal adaptation will be negligible. J. W. T. W.

See Abstr. 2755 535.81 : 535.243

2793 535.81 : 621.3.032.73

Properties of low-reflection films produced by the action of hydrofluoric acid vapour. NICOLL, F. H., AND WILLIAMS, F. E. *J. Opt. Soc. Amer.*, 33, *pp.* 434–435, *Aug.*, 1943.—[See Abstr. 1293 (1942)].

2794 535.822.5

Colour microscopy in ultra-violet rays. BRUMBERG, E. M. *Nature, Lond.*, 152, *p.* 357, *Sept.* 25, 1943.

2795 535.88 : 628.9

An illuminagraphic camera. BENFORD, F. *J. Opt. Soc. Amer.*, 33, *pp.* 440–443, *Aug.*, 1943. *See also Gen. Elect. Rev.*, 46, *pp.* 494–496, *Sept.*, 1943.—[Abstr. 2574 B (1943)].

HEAT. THERMODYNAMICS

2796 536.2 : 621.181

Heat transmission in Lancashire boilers. FOXWELL, G. E. *J. Inst. Fuel*, 16, *pp.* 168–173, *Aug.*, 1943.—[Abstr. 2354 B (1943)].

2797 536.21

Moving sources of heat and the temperature at sliding contacts. JAEGER, J. C. *J. Proc. Roy. Soc., N.S.W.*, 76, *pp.* 203–224, 1943.—A mathematical treatment of heat-transfer problems which arise in connection with 2 materials in sliding contact. Calculated values are derived for specific cases and the results are compared with experimental data [Abstr. 2294 (1936)]. R. W. P.

2798 536.212.3

Thermal insulating properties of clothing. BAXTER, S., AND CASSIE, A. B. D. *J. Text. Inst., Manchr*, 34, *T*41–*T*54, *July*, 1943.—The theory of heat transfer through clothing is developed on the assumption that Newton's law of cooling is adequate for the problem. The theory shows the importance of surface emissivity of fabrics. An apparatus is described which can be used to evaluate both thermal conductivity and surface emissivity of fabrics. Results obtained show that the assumption of Newton's law is justified, data being given for a number of thick and thin fabrics and waddings. A simple method for determining the surface emissivity of fabrics is given. A. E. T.

2799 536.24 : 621.365.411

Heat transfer in batch heat treatment of metallic strip. PAMELEY-EVANS, O. G. *Metallurgia, Manchr*, 28, *pp.* 177–179, *Aug.*, 1943.—[Abstr. 2485 B (1943)].

2800 536.24.08 : 621.316.74.076.7

Electronics applied to heat-transfer tests. BROWN, R. V. *Electronics*, 16, *pp.* 113–115, *July*, 1943.—[Abstr. 2437 B (1943)].

2801 536.413

Thermal expansion of some industrial copper alloys. HIDNERT, P., AND DICKSON, G. *J. Res. Nat. Bur. Stand., Wash.*, 31, *pp.* 77–82, *Aug.*, 1943.

See Abstr. 2722 536.423.1 : 533.16

2802 536.423.45 : 541.123.21

Phase equilibria in hydrocarbon systems. REAMER, H. H., OLDS, R. H., SAGE, B. H., AND LACEY, W. N. *Industr. Engng Chem.*, 35, *pp.* 790–793, *July*, 1943.—The influence of pressure and temperature on the composition of the dew-point gas of the ethane-water system was experimentally established. The work covered pressures up to 10 000 lb./in.^{2} betw. 100° and 460°F.

2803 536.423.45 : 551.576.11

Preliminary note on condensation in the form of clouds and dew. ARCHBOLD, J. W. *Phil. Mag.*, 34, *pp.* 632–642, *Sept.*, 1943.—The author uses classical statistical mechanics to assess the distribution of water drops according to size and to exhibit the competition for growth amongst an assemblage of drops. Gravity has a negligible effect. If there are no electric charges

condensation occurs in large drops, with no cloud. In the presence of charges, the size distribution depends on the charge distribution: if all the drops are similarly charged, condensation still takes place in large drops, but these are accompanied by a cloud of fine drops which is perhaps visible. Ordinary cloud formation is associated with temperature variations and departure from equilibrium conditions. Similar conclusions are reached for dew formation, though here the degree of affinity of water for the bedewed surface is important. A. HU.

See Abstr. 2709 536.44 : 532.14

2804 536.462 : 541.126

Temperature gradients in gaseous explosions. LEAH, A. S. *Nature, Lond.*, 152, *pp.* 303–304, *Sept.* 11, 1943.

See Abstr. 2844 536.483 : 538.662

2805 536.511 : 621.317.313

A note on a compensated hot-wire air thermometer. EL-SHERBINI, M. A., AND YOUSEF, Y. L. *Proc. Phys. Soc., Lond.*, 55, *pp.* 427–428, *Sept.*, 1943.

2806 536.522

Simple temperature indicators from 125° to 1 600°F. *Laboratory*, 14, 2, *pp.* 34–35.—An illustrated note on the use of Tempil pellets which melt at sp. temp. of 750°–1 600°F., and Tempilstiks which are crayon-like marking devices that produce marks which melt and glisten at sp. temp. 125°–700°F. E. R. A.

2807 536.532 : 621.317.39

Measurement of high temperatures in high-velocity gas streams. KING, W. J. *Trans. Amer. Soc. Mech. Engrs*, 65, *pp.* 421–431, *July*, 1943.—[Abstr. 2223 B (1943)].

2808 536.582

Water thermoregulator. BOYD, W. E. *Industr. Engng Chem.* (*Analyt. Edit.*), 15, *p.* 523, *Aug.* 15, 1943.

2809 536.62

Thermal data. XVII. The heat capacity, entropy and free energy of formation of cyclohexane. A new method of heat transfer in low-temperature calorimetry. RUEHRWEIN, R. A., AND HUFFMAN, H. M. *J. Amer. Chem. Soc.*, 65, *pp.* 1620–1625, *Aug.*, 1943.—A description of the apparatus and method, incl. a new method of heat transfer by mechanical contact, is given.

2810 536.633 : 534.321.9

Specific heats of carbon tetrafluoride from supersonic measurements. BYERS, W. H. *J. Chem. Phys.*, 11, *pp.* 348–350, *Aug.*, 1943.—Measurements of the velocity and absorption of ultrasonic waves in CF_4 were made over a range of pressures for each of 2 frequencies. From the dispersion and absorption curves, the sp. ht. for equilibrium conditions, the portion of the sp. ht. due to intra-molecular vibrations, and the mean lifetime of a quantum of vibrational energy, were calculated.

2811 536.655

Heats of vaporization from reference substance plot. GORDON, D. H. *Industr. Engng Chem.*, 35, *pp.* 851–853, *Aug.*, 1943.—A plot of the v.p. of a substance against the v.p. of a ref. substance at the same values of reduced temperature gives a straight line whose slope is equal to $(T_c/T_c') \times (L/L')$, where T_c and L represent the critical temp. and the molal lat. ht. of vaporization, respectively, and the primes indicate a ref. substance.

2812 536.658

The heat of adsorption of ethyl chloride and of sulphur dioxide on sugar charcoal. GREGG, S. J. *J. Chem. Soc., pp.* 351–355, *Aug.*, 1943.—The heats of adsorption were measured by a Bunsen ice calorimeter, and the adsorption isotherms determined from very low pressures up to atm. for SO_2 and up to the sat. v.p. for ethyl chloride, by a volumetric method. There was a sharp fall in the differential heat of adsorption of ethyl chloride, from 11 500 cal./mole to near the lat. ht. of condensation 6 000 cal./mole, within a narrow adsorption range and at pressures $< \frac{1}{4}$ of the sat. v.p. The effect is ascribed to the inception of a layer > 1 molecule thick. Henry's law was not obeyed by either gas even at the lowest pressures studied.

2813 536.7 : 531.19

A partition function for liquids from the harmonic oscillator model. MATSEN, F. A., AND WATSON, G. M. *J. Chem. Phys.*, 11, *pp.* 343–348, *Aug.*, 1943.—The energy of the molecules of a liquid in their equilibrium positions and the frequency of vibration about those positions are expressed in terms of the average distance betw. the molecules. This follows from a formulation of an average potential or spherical symmetry from an assumed force field betw. pairs of molecules. The thermodynamic quantities are calculated from the resultant harmonic-oscillator partition function. Order-disorder effects are neglected.

See Abstr. 2750 536.7 : 535.14

2814 536.7 : 669.71

A thermodynamical theory of restoration phenomena in the ageing of copper-aluminium alloys. KONOBEEVSKI, S. T. *J. Inst. Met.*, 69, *pp.* 397–413, *Sept.*, 1943.—[See Abstr. 2589 (1943)].

See Abstr. 2663 536.71 : 518.3

See Abstr. 2879 536.758 : 539.501

ELECTRICITY. MAGNETISM

2815 537.226 : 539.133 : 621.315.1.017.143

The dipole theory and the characteristics of organic insulators. WALL, T. F. *Engineering*, 156, *pp.* 81–83, *July* 30, 1943.—A survey of Debye's theory, with sp. ref. to dispersion. An application to dielectric loss of overhead conductors is discussed.

2816 537.226.08 : 621.317.79

The dielecometer. JUPE, J. H. *Elect. Rev., Lond.*, 133, *pp.* 271–273, *Aug.* 27, 1943.—[Abstr. 2463 B (1943)].

2817 537.226.1 : 532.14

The effect of pressure upon the dielectric constants of liquids. OWEN, B. B., AND BRINKLEY, S. R., JR. *Phys. Rev.*, 64, *pp.* 32–36, *July* 1 *and* 15, 1943.—An empirical equation with 2 parameters A and B is shown to express the isothermal permittivities of liquids with pressure. The equation is analogous to the Tait equation for the variation of the densities. B is common to both equations, and may be determined independently from either permittivities or densities. A linear relationship betw. the reciprocals of the permittivities and the density may be derived from Tammann's hypothesis and electrostatic theory.

2818 537.311.33 : 537.312.6 : 538.632

The electrical conductivity and isothermal Hall effect in cuprous oxide. FELDMAN, W. *Phys. Rev.*, 64, *pp.* 113–118, *Aug.* 1 *and* 15, 1943.—The conductivity of Cu_2O was studied up to 700°C. The formula $\sigma = Ae^{-\varepsilon/kT}$, valid at higher temperatures, fails below 300°C. The max. and min. observed below 300° result from saturation of clusters and a rapid decrease of mobility. Hall-effect measurements up to 450°C. show that the number of current carriers does not obey the exponential law. An anomaly in mobility is observed around 150°C.

2819 537.311.33 : 548

A note on volume rectification of crystals. KHASTGIR, S. R. *Indian J. Phys.*, 17, *pp.* 111–113, *April*, 1943.—[See Abstr. 1683 (1943)].

2820 537.311.35

Conduction of electricity in highly insulating liquids. PAO CHIA-SHAN. *Phys. Rev.*, 64, *pp.* 60–74, *Aug.* 1 *and* 15, 1943.—Investigations on the natural conductivity, and on the conductivity induced by γ-rays, in iso-octane and liquid oxygen are described. For the natural conductivity, the log. of the current is a linear function of the square root of the field. The larger currents induced by γ-rays rise at first rapidly and then more slowly approaching saturation. The results support Plumley's theory [Abstr. 63 (1941)].

2821 537.311.4 : 621.315.53 = 3

Possibility of reducing the electrical contact resistance of aluminium and Al alloys. WAGNER, C., AND STEIN, V. *Luftfahrtforsch.* 20, *pp.* 31–41, *Feb.* 27, 1943.—[Abstr. 2198 B (1943)].

2822 537.312

The effect of high electrostatic fields on the conductivity of tungsten. VISSAT, P. L. *Phys. Rev.*, 64, *pp.* 119–125, *Aug.* 1 *and* 15, 1943.—An earthed tungsten wire was mounted co-axially with a cylinder which was made neg. rel. to the wire, and a p.d. was applied betw. the cylinder and the wire. The resistance of the wire was measured without and with a field. With a vacuum of 10^{-6} mm. Hg and fields of 10^6 V/cm., an increase in resistance resulted with application of the field; the change depends on temperature and vacuum conditions; no change occurred below a certain p.d.; a small leakage current occurs. The results are explainable by ionization currents.

2823 537.312.5

The photoconductivity of lead chromate. GOLDMAN, J. E., AND LAWSON, A. W. *Phys. Rev.*, 64, *pp.* 11–18, *July* 1 *and* 15, 1943.—The variation of the photoconductivity of $PbCrO_4$ with wavelength of the exciting radiation is described. The conductivity ref. to unit intensity of the incident radiation is a max. in the blue corresp. to 5×10^{-3} A/W at saturation. Subsidiary max. occur in the red and the near ultraviolet. Data on the spectral scattering of $PbCrO_4$ are given. The dependence of photoconductivity on time, electric field and previous history of the specimen are illustrated. On the basis of unit quantum efficiency, the mean displacement distance of photoelectrons in $PbCrO_4$ is 3×10^{-3} cm.

See Abstr. 2818 537.312.6 : 538.632 : 537.311.33

2824 537.322

A note on the thermo-electromotive force. HERZFELD, K. F. *Phys. Rev.*, 64, *pp.* 37–38, *July* 1 *and* 15, 1943.—A simple kinetic interpretation of the thermo e.m.f., applicable in quantum theory and classical theory, is given. The usual expression can be transformed to agree with the result.

2825 537.525.5

The mercury arc cathode. SMITH, C. G. *Phys. Rev.*, 64, *p.* 40, *July* 1 *and* 15, 1943.—Erratum [Abstr. 187 (1943)].

2826 537.525.8

Nature of active nitrogen. MITRA, S. K. *Sci. and Cult.*, 9, *pp.* 49–50, *July*, 1943.

2827 537.525.8 : 621.3.015.532

Initiation of glow discharges. CRAGGS, J. D., AND MEEK, J. M. *Nature, Lond.*, 152, *pp.* 386–387, *Oct.* 2, 1943.

2828 537.531

The origin of the $M\zeta_1$ and $M\zeta_2$ X-ray satellite groups. HIRSCH, F. R., JR. *Phys. Rev.*, 64, *p.* 39, *July* 1 *and* 15, 1943.—[See Abstr. 3173 (1940)].

2829 537.531 : 535.3

Generalization of the Bragg–de-Broglie principle of rotatory focusing for X-ray spectrography. Application to double-crystal spectrographs. Focusing and mosaic structure. TELLEZ-PLASENCIA, H. *Arch. Sci. Phys. Nat.*, 25, *pp.* 35–54, *Jan.–Feb.*, 1943.—Geometrical. Extends the principle of focusing to the case where the slit and film are not equidistant from the crystal axis. It is shown that focusing will take place if the angular velocities of the slit and film, with resp. to the crystal, vary in inverse proportion to the respective radii. Focusing can also be obtained with the transmission method or with 2 crystals; and it is also possible to eliminate almost completely the loss of resolving power consequent upon crystal imperfections. J. T.

2830 537.531 : 535.338

Short-wavelength limit of the continuous X-ray spectrum and determinations of h/e. OHLIN, P. *Nature, Lond.*, 152, *pp.* 329–330, *Sept.* 13, 1943.

See Abstr. 2757 537.531 : 535.4 : 535.247.4

See Abstr. 2912 537.533.73 : 541.61

2831 537.533.74

Multiple scattering of fast electrons. II. ANDRIEVSKY, A. I., KULCHITSKY, L. A., AND LATYSHEV, G. D. *J. Phys., U.S.S.R.*, 6, 6, *pp.* 279–282, 1943.—The multiple scattering of 2·25 eMV electrons in Li, Be and C is investigated. The effect of inelastic scattering by atomic electrons is estimated. The inelastic scattering of fast electrons increases the ½-width of the Gauss curve of multiple scattering by a factor $(1 + Z^{-1})^{1/2}$. [See Abstr. 2370 (1942)].

2832 537.533.8

The spatial asymmetry of Cerenkov radiation as a function of electron energy. WYCKOFF, H. O., AND HENDERSON, J. E. *Phys. Rev.*, 64, *pp.* 1–6, *July* 1 *and* 15, 1943.—The properties of the radiation [Abstr. 2080, 2081 (1937)] produced when high-speed electrons traverse transparent media was studied as a function of the energy of the bombarding particle. The direction of emission of the radiation for mica over the range 240–815 kV is given by the relation proposed by Frank and Tamm [Abstr. 2082 (1937)]. The experiments were carried out with a transformer-rectifier source of potential and an electron tube giving a well-collimated beam of electrons.

2833 537.591.1

The atmospheric absorption curves and their dependence on the nature of the primary cosmic rays. CHAKRABARTY, S. K. *Indian J. Phys.*, 17, *pp.* 121–129, *April*, 1943.—Absorption curves for the soft primary constituents of cosmic rays are obtained, based on 2 different hypotheses for the energy spectra. One assumes the primary particles to have all possible energies, the other that they can have only certain discrete energies. There is considerable difference betw. theory and experiment for the absorption coeffs. near the top of the atmosphere. Comparison of the absorption coeffs. at great depths, and the sea-level latitude effect, indicate that the primary cosmic rays must contain protons. Experiment indicates that these cannot have a continuous energy spectrum.

A. J. M.

2834 537.591.1 : 535.14

Theory of cosmic-ray mesons. HAMILTON, J., HEITLER, W., AND PENG, H. W. *Phys. Rev.*, 64, *pp.* 78–94, *Aug.* 1 *and* 15, 1943.—The quantum theory of damping [Abstr. 2558 (1942)] is applied to the production of mesons by proton-proton collisions. A primary radiation consisting of protons with a suitable energy spectrum is assumed, and it is shown that nearly all mesons are produced in a top layer of the atmosphere of thickness 15–30 cm. H_2O. The variation of the meson intensity with energy, height and geomagnetic latitude agrees with experiments. The transverse mesons give a satisfactory account of the soft component.

2835 537.591.1 : 551.543

Barometer effect of penetrating cosmic-ray showers. JÁNOSSY, L., AND ROCHESTER, G. D. *Nature, Lond.*, 152, *p.* 445, *Oct.* 16, 1943.

2836 537.591.5

Electrons in equilibrium with the penetrating component of cosmic rays in lead at 10 000 feet and at sea level. HAZEN, W. E. *Phys. Rev.*, 64, *pp.* 7–10, *July* 1 *and* 15, 1943.—The number of electrons (N) in equilibrium was measured with Wilson cloud chambers containing Pb plates. Comparison is made with values calc. from the equations of Bhabha and Tamm and Belenky with a mesotron mass of 200 m. and Blackett's cosmic-ray spectrum. If the loss of low-energy electrons as a result of scattering is taken into account, the calc. values for N are slightly $>$ the exp. values. If the calc. values are assumed to be correct, the results provide additional evidence that protons constitute only a fraction of the cosmic-ray particles in the lower atmosphere.

2837 538.114

The scientific significance of ferromagnetism. BITTER, F. *J. Wash. Acad. Sci.*, 33, *pp.* 235–238, *Aug.* 15, 1943.

See Abstr. 2853 538.245 : 539.185

2838 538.248 : 621.317.4 : 621.318.2 = 3

Two methods for the determination of the remanence of permanent magnets. JELLINGHAUS, W. *Z. techn. Phys.*, 23, 12, *pp.* 321–324, 1942. *Abstr. in Wireless Engr*, 20, *p.* 403, *Aug.*, 1943.—[Abstr. 2467 B (1943)].

2839 538.3 : 621.3.012.8

Equivalent circuits to represent the electromagnetic field equations. KRON, G. *Phys. Rev.*, 64, *pp.* 126–128, *Aug.* 1 *and* 15, 1943.

2840 538.563 : 621.314.671 : 621.396.622.7

The diode as a rectifier and a detector for weak signals. AHARONI, J. *Phil. Mag.*, 34, *pp.* 505–521, *Aug.*, 1943.—[Abstr. 2530 B (1943)].

2841 538.566 : 621.396.11

Reflection and transmission by absorbing dielectrics of electromagnetic waves in hollow tubes. PINCHERLE, L. *Phil. Mag.*, 34, *pp.* 521–532, *Aug.*, 1943.—[Abstr. 2523 B (1943)].

2842 538.614

Magnetic rotatory power of crystalline nickel sulphate in the short infra-red spectrum. BREEN, S., HUMPHREY, J. N., AND INGERSOLL, L. R. *Phys. Rev.*, 64, *pp.* 75–77, *Aug.* 1 *and* 15, 1943.—The activity of thin crystals of $NiSO_4$ α-hexahydrate was measured by the spectroradiometric method in the range $0{\cdot}7\ \mu$ to $1{\cdot}9\ \mu$ and for ordinary and low (— 125°C.) temperatures. The curves showing the dispersion of the rotation have anomalies in the region of $\lambda\, 0{\cdot}69\ \mu$ and particularly $1{\cdot}16\ \mu$. The ratio of the rotations at low temp. and room temp. is itself an anomalous curve. The effects can be explained on the basis of the inverse Zeeman effect.

2843 538.614

The magneto-optic rotation of hydrogen peroxide. GIGUÈRE, P. A., AND FEENY, H. *Canad. J. Res. A*, 21, *pp.* 69–73, *Aug.*, 1943.—The magnetic rotatory power, of aqueous solutions of H_2O_2 of various conc. was measured at 10°C. with the Na D-line and the yellow, green and blue lines of Hg. By extrapolation the Verdet const. of H_2O_2 for the Na light was found to be $0{\cdot}01148 \pm 0{\cdot}001$ min. per gauss-cm., as compared with 0·01309 for water.

See Abstr. 2818 538.632 : 537.312.6 : 537.311.33

2844 538.662 : 536.483

On the adiabatic demagnetization of iron alum. SAUER, J. A. *Phys. Rev.*, 64, *pp.* 94–112, *Aug.*1 *and* 15, 1943.—The effect of the perturbing actions of crystalline field and magnetic dipole-dipole coupling on the magnetic moment and the entropy is calculated to second-order terms in the magnetic coupling and to third-order terms in the crystal-line potential, for crystalline fields of cubic or axial symmetry. Theoretical values of the adiabatic moment agree with exp. values [Abstr. 805 (1940)]. A true thermodynamic scale is established by which the temperature was calculated at any value of the magnetic field during demagnetization. [See Abstr. 3255 (1936)].

MOLECULAR AND ATOMIC PHYSICS

2845 539.13 : 678

Structure of rubber. HOUWINK, R. *J. Phys. Chem.*, 47, *pp.* 436–442, *June*, 1943.—The presence or absence is examined of branching of the long-chain mols. and the development, in raw rubber on keeping, of bridges which cross-link the long chains and produce coherence. An expression is found for the degree of compactness of the irregular coils of chain mols. in solution. In raw rubber the coils are probably already partly cross-linked. Changes during vulcanization are discussed. N. M. B.

See Abstr. 2883 539.132 : 541.123.21

2846 539.132 : 678

Statistical length of paraffin molecules. TRELOAR, L. R. G. *Proc. Phys. Soc., Lond.*, 55, *pp.* 345–361,

Sept., 1943.—Methods are outlined for representing the distribution of lengths of a thermally fluctuating paraffin mol. over the whole range of any chain length. Results are given for paraffin chains of 3, 4, 5, 10, 20, 40 and 80 links. For the higher members of the series, results diverge rapidly from the Kuhn formula as the length approaches that of the extended chain. This is important in the development of the kinetic theory of elasticity of rubber.

N. M. B.

See Abstr. 2815 539.133 : 621.315.1.017.143 : 537.226

See Abstr. 2769 539.152.2 : 535.338.42

See Abstr. 2694 539.153 : 530.145.63

2847 539.154.3

Complex ions. V. The magnetic moments of some complex ions of nickel and copper. Russell, C. D., Cooper, G. R., and Vosburgh, W. C. *J. Amer. Chem. Soc.*, 65, *pp.* 1301–1306, *July*, 1943.—The magnetic moments of several complex ions of Ni and Cu were measured in aq. solution. For both series of complex ions, the orbital magnetic moment decreases as complex ions are formed in solution, and this decrease is greater the more stable the complex. A linear relationship betw. magnetic moment and max. absorption frequency was observed.

2848 539.16.08

A mica-window Geiger counter tube for measuring soft radiations. Copp, D. H., and Greenberg, D. M. *Rev. Sci. Instrum.*, 14, *pp.* 205–206, *July*, 1943.—A tube which combines the speed of a metal-walled tube with sensitivity to soft radiations consists of a NO_2-treated metal cylinder covered at one end by a thin sheet of mica (0·02 mm.) and at the other end by a glass bell with a central capillary. Through this capillary is sealed a piece of 8-mil tungsten wire with a drop of glass fused over the end. The tube is operated at 10 cm. of Hg with a mixture of 10% ethanol and 90% A.

2849 539.16.08

A counting method for the determination of small amounts of radium and of radon. Curtiss, L. F., and Davis, F. J. *J. Res. Nat. Bur. Stand., Wash.*, 31, *pp.* 181 *et seq.*, *Sept.*, 1943.—A method for determining small quantities of radon is described, in which the α particles from the radon and RaA and RaC are counted in an ion-counting chamber. Details of an arrangement for automatically making a printed record of the hourly total count are given.

2850 539.16.08 : 621.316.722.076.6

A combined voltage-regulating and quenching circuit for the Geiger–Müller counter. Bale, W. F., and Bonner, J. F., Jr. *Rev. Sci. Instrum.*, 14, *pp.* 222–223, *July*, 1943.

2851 539.163.2

On the theory of the electrostatic beta-particle energy spectrograph. III. Rogers, F. T., Jr., and Horton, C. W. *Rev. Sci. Instrum.*, 14, *pp.* 216–220, *July*, 1943.—A study is made of the focusing action of the electrostatic analyser on particles having relativistic speeds. A dependence of focal length on particle speed is derived; and its effects on the use of the analyser for continuous spectra is examined. [See Abstr. 733 (1940)].

2852 539.172

On the branching ratio of Na^{22}. Weltin, H. *Phys. Rev.*, 64, *p.* 128, *Aug.* 1 *and* 15, 1943.

2853 539.185 : 538.245

Neutron polarization and ferromagnetic saturation. Bloch, F., Hamermesh, M., and Staub, H. *Phys. Rev.*, 64, *pp.* 47–56, *Aug.* 1 *and* 15, 1943.—The transmission of thermal neutrons through magnetized iron was measured in its dependence upon percentage deviation, ε, from saturation and thickness, d, of the sample. The percentage increase of transmission is $(n^2p^2d^2/2)f(\lambda/\varepsilon d)$ [Abstr. 1926 (1941)], where n = the number of Fe atoms per unit vol. From the determined value $\lambda = 3{\cdot}2 \pm 0{\cdot}3 \times 10^{-3}$ cm., the linear dimensions of the microcrystals can be determined. For $d = 3{\cdot}8$ cm. a transmission effect of 8% was observed within 2·5% of saturation.

2854 539.211

A suggested procedure for the examination after failure of glass-melting pots. Preston, E. *J. Soc. Glass Technol.*, 27, *pp.* 53*T*–59*T*, *April*, 1943.

2855 539.213.2 : 666.1

The problem of cords in glass. Turner, W. E. S. *J. Soc. Glass Technol.*, 27, *pp.* 42*T*–52*T*, *April*, 1943.—A discussion of the causes, methods of detection and of prevention or cure of inhomogeneity.

2856 539.215.1 : 662.613.1

Cenospheres from various sources. Carlile, J. H. G. *Fuel in Sci. and Pract.*, 22, *pp.* 87–92, *July–Aug.*, 1943.—Cenospheres are the hollow spherical globules of carbonized products which are produced in combustion processes. This paper gives a brief description of recent work, incl. observations on the production of cenospheres from carbonaceous materials, i.e. pitch, fuel oil and pulverized fuel, and in industrial processes. Photo-micrographs of typical particles are reproduced.

A. E. T.

2857 539.216.1 : 620.17 : 621.317.39.087.6

Autographic load/elongation apparatus for fibres. Sookne, A. M., and Rutherford, H. A. *J. Res. Nat. Bur. Stand., Wash.*, 31, *pp.* 25–31, *July*, 1943.—[Abstr. 2455 B (1943)].

2858 539.217 : 532.685 : 533.15

The permeability of porous solids to gases and liquids. Grunberg, L., and Nissan, A. H. *J. Inst. Petrol.*, 29, *pp.* 193–225, *Aug.*, 1943.—The flow of air, water and aqueous solutions of NaCl and *n*-amyl alcohol through layers of oolitic limestone, magnesium limestone, fine and coarse sandstones and a Jena glass filter were studied experimentally; tests on liquids were confined to flow through the filter. There appears to be no correlation betw. the permeabilities to gases and to liquids. Permeability to gases is dependent mainly on Reynolds's number which, at small values, gives rise to max. and min.; for higher values, preceding the turbulent régime, permeability is const. corresp. to viscous conditions. Permeability to liquids is dependent on viscosity and properties causing variation in the effective cross-section of the pores under viscous flow. It was possible to correlate values of permeability for the same or different liquids at the same or different temperatures.

J. S. G. T.

2859 539.217 : 676

Relationship between air permeability and oil permeability of paper. LANE, W. H. *Paper Trade J.*, 117, *pp.* 28–32, *July* 15, 1943.—Results are given of an investigation of the mechanism of flow of printing-ink into paper during the printing process; data obtained show that the log. of air or oil permeability is essentially ∝ freeness of stock; this relationship can hold only when freeness is the sole variable. E. R. A.

2860 539.217 : 676

Instrument for measuring liquid permeability of paper and porous materials. LANE, W. H. *Paper Trade J.*, 117, *pp.* 26–27, *July* 15, 1943.—An instrument is described which is capable of measuring oil permeability of paper over a wide range of permeabilities. E. R. A.

2861 539.217.3

Influence of the size of exchangeable ions on the permeability of soils. NAYAR, M. R., AND SHUKLA, J. P. *Curr. Sci.*, 12, *pp.* 206–207, *July*, 1943.

2862 539.217.5 : 533.15

Fluid flow through porous media. II. Porosity, permeability and average grain size of consolidated sands. SEN GUPTA, N. C., AND NYUN, M. G. T. *Indian J. Phys.*, 17, *pp.* 39–42, *Feb.*, 1943.—Permeabilities, porosities and particle-size distribution curves of 13 sand core samples were obtained. With increase in average particle dia. the porosity at first increased and then approached a const. lim. value. Permeability increased continuously with average dia. [See Abstr. 246 (1943)].

2863 539.232

Orientation in stretched films of amylose triacetate. WHISTLER, R. L., AND SCHIELTZ, N. C. *J. Amer. Chem. Soc.*, 65, *pp.* 1436–1437, *July*, 1943.

See Abstr. 2892 539.232 : 620.19 : 541.127

2864 539.266

The structure of liquid carbon tetrachloride. BRAY, L. E., AND GINGRICH, N. S. *J. Chem. Phys.*, 11, *pp.* 351–354, *Aug.*, 1943.—Monochromatic X-ray diffraction patterns of liq. CCl_4 at 25°C. and − 20°C. were analysed to obtain radial electron-density distribution curves. These curves show peaks corresp. to distances betw. atoms in a molecule as well as other peaks repr. distances betw. atoms in different molecules. [See Abstr. 2011 (1943)].

ELASTICITY. STRENGTH

2865 539.319 : 621.791.565.054

Investigation of the lateral distortion produced in mild-steel plates by oxyacetylene cutting. OSGOOD, C. C. *Weld. J.*, *pp.* 308*s*–316*s*, *July*, 1943.—[Abstr. 2554 B (1943)].

See Abstr. 2783 539.379 : 679.56 : 535.551

2866 539.382.08

A simple optical method of determining Young's modulus. CHAUDHARI, K. R. *Curr. Sci.*, 12, *pp.* 203–204, *July*, 1943.

2867 539.4 : 679.5

Effect of fillers and of mixing procedure on the strength of plastic materials. KYNOCK, W., AND PATRONSKY, L. A. *Techn. Not. Nat. Adv. Comm. Aero., Wash., No.* 878, *Jan.*, 1943.—The object of the study was to determine the effect of the differences in composition of moulding powders on physical properties of std. test pieces moulded from them. As the effect of differences in the proportion of filler was the only phase to be investigated, methods of mixing, grinding, etc., were standardized to approximate those methods common in industrial practice. E. R. A.

2868 539.4 : 679.56

Strength and properties of Plexiglas. BARTOE, W. F. *Aviation*, 42, *pp.* 128–131 *and* 135, *Jan.*, *and pp.* 140, 143, 145, 147 *and* 359, *March*, 1943.—Fundamental strength factors and impact-strength tests and results are discussed; tensile and flexural tests are dealt with. E. R. A.

2869 539.4 : 679.56.004.12

Basic physical properties of laminates. FIELD, P. M. *Mod. Plast., pp.* 91–102, *Aug.*, 1943.—[Abstr. 2600 B (1943)].

2870 539.4.013.3

An investigation of the technical cohesive strength of metals. MCADAM, D. J., JR., AND MEBS, R. W. *Metals Technol., Aug.*, 1943. *Techn. Publ. Amer. Inst. Min. Metallurg. Engrs, No.* 1615, [63 *pp.*], 1943.—An experimental investigation of the tensile properties of notched specimens of some ferrous and non-ferrous metals to study the influence of the combination of principal stresses and of plastic extension on the technical cohesion limit, ultimate stress, yield stress and ductility. Attention is confined to stress combinations with 2 principal stresses equal and with axial stress > radial stress. The materials tested were oxygen-free Cu, monel metal, 13/2 Cr/Ni steel, and two C steels, all in the form of round rods. The influence of notch angle, notch depth and root radius on the stress, concentration, yield stress and ultimate stress is represented by families of curves, and pairs of diagrams are employed to give a complete picture of the influence of notches on the breaking stress and ductility. [See Abstr. 2162 (1942)]. G. E. A.

2871 539.4.014.11

The philosophy of stress concentrations. KOERNER, C. F. *J. Instn Engrs, Aust.*, 15, *pp.* 111–114, *May*, 1943.—Certain accepted methods in engineering design give only average stresses through considerable volumes and not the true max. stresses. The latter occur through small volumes and are called stress concentrations (S.Cs.). Ordinary methods yield a first approx. to the stress; further approx. may be made by considering S.Cs. The case of a simple tension member with hole is taken to show that the stress at the edges of the hole may be 3 times the average stress on the net section. S.Cs. occur at any discontinuity in a member or in the applied load, and the ratio: max. stress/stress calculated by ordinary methods, is termed the S.C. factor. This factor, for cases investigated, never exceeded 3, and with gradual discontinuity is unlikely to exceed 2. The effect of S.Cs. on the usefulness of a load-carrying member depends on the nature of the material used, especially its ductility, the relative volume through which the concentrations extend and the nature of the load. In a brittle member the factor of safety is equal to the ordinary factor/S.C. factor. Stress concentrations have a serious effect on fatigue strength. Methods of determining stress values at concentrations are con-

sidered under: calculation; use of models; and photo-elastic methods. G. E. A.

See Abstr. 2935 539.4.016.2 : 669.355 : 548.73

2872 539.4.019

The technical cohesive strength and other mechanical properties of metals at low temperatures. McAdam, D. J., and Mebs, R. W. *Proc. Amer. Soc. Test. Mater.*, [43 *pp.*], 1943. *Prepr.*—Comparison of diagrams repr. the technical cohesive strength of metals at room temp. and at low temp. and gives a basis for interpretation of the influence of low temp. on the strength, ductility and total work of notched and unnotched specimens. The variation of properties was studied with ref. to the usual scale of temperatures and to a scale of equal thermodynamic efficiencies.

2873 539.431 : 621.78

Improving fatigue strength of machine parts. Almen, J. O. *Mech. Engng, N.Y.*, 65, *pp.* 553–563, *Aug.*, 1943.—[Abstr. 2546 B (1943)].

2874 539.431 : 621.785.53

Factors affecting the influence of nitriding on fatigue strength. Bardgett, W. E. *Metal Treatm.*, *pp.* 87–101, *Summer*, 1943.—[Abstr. 2551 B (1943)].

2875 539.431 : 621.882

Effect of screw threads on fatigue. Arnold, S. M. *Mech. Engng, N.Y.*, 65, *pp.* 497–505, *July*, 1943.—[Abstr. 2561 B (1943)].

2876 539.431 : 669.35 : 620.1 : 621.315.5

The fatigue and corrosion-fatigue of copper alloys. I–II. Donaldson, J. W. *Metal Ind., Lond.*, *pp.* 178–180, *Sept.* 17, *and pp.* 198–200, *Sept.* 24, 1943.—[Abstr. 2403 B (1943)].

2877 539.433 : 674.049 : 620.17

Fatigue characteristics of natural and resin-impregnated compressed laminated woods. Fuller, F. B., and Oberg, T. T. *J. Aero. Sci.*, 10, *pp.* 81–85, *March*, 1943.—[Abstr. 2340 B (1943)].

2878 539.501

A new criterion for expressing the "intensity of firmness" of soft bodies. Blair, G. W. S. *Nature, Lond.*, 152, *p.* 412, *Oct.* 9, 1943.

2879 539.501 : 536.758

The kinetic theory of rubber. Auluck, F. C., and Kothari, D. S. *J. Chem. Phys.*, 11, *pp.* 387–392, *Aug.*, 1943.—The (isothermal) Young's modulus of ideal rubber is determined by statistical methods. The macro-state of a chain-molecule is defined in terms of its length.

2880 539.501 : 677.46

Elasticity, creep and recovery of acetate and viscose rayon yarns. Mark, H., and Press, J. *Rayon Text. Mon.*, 24, *pp.* 297–299, *June*, 1943.—Elasticity, flow and relaxation of acetate and viscose rayon were measured; stresses ranged from 0·1 to 2·5 g./denier, and were applied for periods of 10^{-2} to 10^{6} sec.; a quantitative description and molecular interpretation of flow and relaxation curves is given. E. R. A.

2881 539.52 : 669.14 : 620.179.2

Guide to the weldability of steels. *Weld. J.*, *pp.* 333*s*–352*s*, *Aug.*, 1943.—[Abstr. 2342 B (1943)].

2882 539.537 : 678

Effect of temperature on resilience of natural and synthetic rubber. Jones, H. C., and Snyder, E. G. *India Rubb. World*, 108, *pp.* 137–140, *May*, 1943.—Experimental results are discussed; the effect of various factors on pendulum tests at 0 to 100°C., and rebound and hardness of pure gum and pigmented stocks, are investigated. E. R. A.

PHYSICAL CHEMISTRY

See Abstr. 2723 541.122.4.011.4 : 533.21

See Abstr. 2719 541.123.21 : 532.739

See Abstr. 2802 541.123.21 : 536.423.45

2883 541.123.21 : 539.132

Equilibrium in hydrogen-water systems containing tritium. Black, J. F., and Taylor, H. S. *J. Chem. Phys.*, 11, *pp.* 395–402, *Sept.*, 1943.—The equilibrium const. of the reaction $HT + H_2O = H_2 + HTO$ involving radioactive hydrogen (T) was determined from 289° to 576°K. in contact with a Pt-charcoal catalyst. Comparison of the exp. results with theory [Abstr. 1933 (1943)] confirms the assumption that the forces acting within a molecule are unaltered by the change in nuclear mass and that any effects on the properties of the molecule are solely due to a different mass moving in the same force field.

2884 541.123.3

The system *n*-hexane-methylcyclopentane-aniline. Darwent, B. de B., and Winkler, C. A. *J. Phys. Chem.*, 47, *pp.* 442–454, *June*, 1943.—The system was investigated at 3 temp. to determine if available relations for distribution betw. solvent layers and methods for obtaining straight consolute lines in the case of the corresp. system containing *n*-heptane apply. The fair agreement obtained points to general applicability, under certain temp. restrictions, to systems of this type. N. M. B.

2885 541.123.52

Interchange of hydrogen isotopes with complex salts. I. Kinetics of the interchange with the luteocobaltic complex. Anderson, J. S., Briscoe, H. V. A., and Spoor, N. L. **II. Kinetics of the interchange with platinous and palladous tetrammines.** Anderson, J. S., Briscoe, H. V. A., Cobb, L. H., and Spoor, N. L. *J. Chem. Soc.*, *pp.* 361–372, *Aug.*, 1943.—The H of hexamminocobaltic chloride and of trisethylenediamminocobaltic chloride undergoes isotope exchange with heavy water in solutions. The interchange reaction in buffered solutions proceeds at measurable speed, according to a pseudo-unimolecular law, the reaction rate being $\propto (p\mathrm{H})^{-2}$, but indep. of the conc. of ammine, or of the proportion of deuterium that it contains. The interchange mechanism is interpreted on the basis that a metal ammine group $M–NH_3$ can ionize as an acid, forming a metal amide-group, $M–NH_2$, and H^+. Experiments were extended to tetrammino-platinous and -palladous chlorides. The rate of interchange with ammines of different metals decreases in the order $Co > Pt > Pd$, and runs parallel to the stability of the complex ions. Tetrammino-palladous chloride undergoes interchange by a complex mechanism; in addition to interchange by the acid dissociation mechanism, it reacts in acid solution by reversible dissociation of NH_3 from the complex.

2886 541.123.59 : 541.128.1

The use of the exchange between carbon dioxide, carbonic acid, bicarbonate ion and water for isotopic concentration. Reid, A. F., and Urey, H. C.

J. Chem. Phys., 11, *pp.* 403–412, *Sept.*, 1943.—A study was made of the exchange of O and C in the reactions: CO_2 (dissolved) + $H_2O \rightleftarrows H_2CO_3$, CO_2 (dissolved) + $OH^- \rightleftarrows HCO_3^-$. The rate of the first could be increased 4–5 times and the rate of the second up to 2 000 times by heterogeneous catalysis. The necessity for turbulent flow in the gas phase was established. Pressures of 1–50 atm. were tried, as the increase of CO_2 pressure increases the conc. of CO_2 (dissolved) and thus speeds up the exchange. A comparison of the above method with the HCN–CN^- method of separation of C isotopes shows the cyanide exchange to be somewhat faster.

2887 541.124

Mechanism of the steam-carbon reaction. WARNER, B. R. *J. Amer. Chem. Soc.*, 65, *pp.* 1447–1451, *Aug.*, 1943.—The primary products are CO and H_2 and CO_2 is formed from the water-gas reaction which reaches equilibrium. The rate of gasification is governed by an adsorption isotherm from the steam and a steam saturation pressure exists above which the rate of gasification at a given temp. becomes const.

2888 541.124

Kinetics of the thermal decomposition of *n*-propyl and isopropyl formates. ANDERSON, R. B., AND ROWLEY, H. H. *J. Phys. Chem.*, 47, *pp.* 454–463, *June*, 1943.—A study of the thermal decompositions in the range 310° to 400° showed that in both cases the principal primary reactions are the decomposition to propene and formic acid, and that this is followed by a rather complex decomposition of the formic acid expressed by $HCO_2H \rightarrow H_2 + CO_2$; $HCO_2H \rightarrow H_2O + CO$; $2HCO_2H \rightarrow H_2O + CO_2 + HCHO$. The results indicate that other primary reactions must occur to a slight extent. The rate of propene formation is of the first order, and experimental activation energies for this step are 39 660 cal. for the *n*- and 44 230 cal. for the iso-propyl formate. Equations for the velocity constants for these reactions are given. N. M. B.

2889 541.124 : 541.147.2

The mercury-photosensitized decomposition of *n*-butane. HAY, A. W., AND WINKLER, C. A. *Canad. J. Res. B*, 21, *pp.* 149–155, *Aug.*, 1943.—The decomposition at 100°, 175° and 250°C. yields H, octanes and dodecanes as the main products. The mechanism of the reaction is concluded to be a C–H bond split, followed by radical combination reactions.

2890 541.124.7

A simple approximate relation between successive dissociation constants of symmetrical inorganic oxygen acids. HILL, T. L. *J. Amer. Chem. Soc.*, 65, *pp.* 1564–1566, *Aug.*, 1943.—An equation is obtained which makes it possible, when 2 or more dissociation const. are known, to predict other unmeasured dissociation const. of symmetrical inorganic oxygen acids.

2891 541.124.7

The acidic dissociation constants of phenoxyacetic acid and its derivatives. HAYES, N. V., AND BRANCH, G. E. K. *J. Amer. Chem. Soc.*, 65, *pp.* 1555–1564, *Aug.*, 1943.—The dissociation constants of phenoxyacetic acid and 26 of its derivatives were measured and compared with those of benzoic acid and its corresp. derivatives. Excepting Br and I compounds (*a*) the const. of *meta* derivatives can be calculated from those of the corresp. derivatives of benzoic acid by Hammett's equations, (*b*) const. for *para* derivatives are slightly low, when the substituent resonates strongly with the aromatic nucleus, and (*c*) const. for all *ortho* derivatives are too high.

See Abstr. 2804 541.126 : 536.462

2892 541.127 : 539.232 : 620.19

Laws governing the growth of films on metals. EVANS, U. R. *Trans. Electrochem. Soc.*, 83, *Prepr. No.* 10, 1943.—[Abstr. 2343 B (1943)].

2893 541.127 : 541.64

Some remarks on the kinetics of vinyl-derivative polymerization. ABERE, J., GOLDFINGER, G., MARK, H., AND NAIDUS, H. *J. Chem. Phys.*, 11, *pp.* 379–386, *Aug.*, 1943.—The steps of vinyl polymerization reactions are discussed. Activation is considered to occur by collision of an unactivated monomer with another monomer, a catalyst, a solvent, or a polymer molecule. Normal chain growth and chain transfer are considered. Termination of growing chains is assumed possible by collision with another growing chain, with an activated monomer, with a molecule of the catalyst, or with chain-breaking impurities. Equations are derived for the reaction rate and for the number average polymerization degree, and compared with experiments.

2894 541.127.1

Lead tetra-acetate oxidations in the sugar group. IV. The rates of oxidation of trehalose, levoglucosan, α-methyl-*L*-sorbopyranoside, polygalitol and styracitol in glacial acetic acid. HOCKETT, R. C., DIENES, M. T., AND RAMSDEN, H. E. *J. Amer. Chem. Soc.*, 65, *pp.* 1474–1477, *Aug.*, 1943.—Std. conditions for measuring the rates of oxidation of substances by lead tetra-acetate are described.

2895 541.128.1

The hydrolysis of hydrogen cyanide in acetic acid solutions with mineral acids as catalysts. KRIEBLE, V. K., DUENNEBIER, F. C., AND COLTON, E. *J. Amer. Chem. Soc.*, 65, *pp.* 1479–1482, *Aug.*, 1943.—The rates of hydrolysis increase rapidly as the conc. of water in the solvent decreases. HCl is a better catalyst than H_2SO_4 and hydrolyses hydrogen cyanide several million times faster in acetic acid than it does in water. The rate varies as the (mean ion activity)^2 or as the activity of the molecule of the acid.

See Abstr. 2886 541.128.1 : 541.123.59

See Abstr. 2918 541.128.1 : 541.64 : 541.653

2896 541.128.24 : 772

Oxidation processes. XV. The effect of reducing agents on the autoxidation of some photographic developing agents. WEISSBERGER, A., THOMAS, D. S., JR., AND LU VALLE, J. E. *J. Amer. Chem. Soc.*, 65, *pp.* 1489–1495, *Aug.*, 1943.—The effect of ascorbic acid and dihydroxymaleic acid on the autoxidation of organic developing agents is investigated. A retardation is observed in most cases. This is explained on the assumption that the autoxidation of the developing agents is catalysed by their quinonoid oxidation products, and that the added reducing agents eliminate these. In some cases, the reducing agents accelerate the autoxidation. The acceleration is caused by the formation of semi-quinones in the reduction of the quinones.

2897 541.132

The effect of sodium chloride upon the ionization of boric acid at various temperatures. OWEN, B. B., AND KING, E. J. *J. Amer. Chem. Soc.*, 65, *pp.* 1612–1620, *Aug.*, 1943.—A method is described by which the ionization of a weak acid in salt solutions is determined by cells containing buffered solutions without liq. junctions. By a shift of std. state to conform with each salt conc., the method is equivalent to that used in determining ionization const. in pure water, and in mixtures of water and non-aq. solvents. The ionization const. of H_3BO_3 is determined in NaCl solutions at 7 conc. betw. 0·02 and 3·0 molal and 5° and 55°.

2898 541.132 : 535.56

Electrodialysis of sugar borates. COLEMAN, G. H., AND MILLER, A. *Proc. Iowa Acad. Sci.*, 49, *pp.* 257–261, 1942.—Glucose and maltose migrate toward the anode in an electrical field in the presence of borax, their reduction values are lowered, but raised by addition of glycerol or mannitol. The sp. rotation of *D*-glucose is affected by borax, and values from + 52° to − 8° are obtainable by varying the conc. of the glucose and the borax. The sp. rotation of maltose is raised slightly, and will change with varying conc.

2899 541.134

The formal electrode potentials of palladium in aqueous hydrochloric and perchloric acid solutions. Stability of chloropalladite ion. TEMPLETON, D. H., WATT, G. W., AND GARNER, C. S. *J. Amer. Chem. Soc.*, 65, *pp.* 1608–1612, *Aug.*, 1943.—The formal electrode potential of Pd salts in 0·9952 *f* HCl was determined at 15°, 25° and 35°. Measurements of the potentials in mixtures of $HCl/HClO_4$ solutions of const. total acid conc. and const. ionic strength indicate that bivalent Pd exists in the chloride solutions mainly as $PdCl_4^{=}$. The potentials were measured in $HClO_4$ solution in the absence of chloride ion.

See Abstr. 2714 541.135.6 : 532.613.4

2900 541.136.22 : 621.352.12

A simple and efficient calomel half-cell. HAHN, F. L. *Science*, 98, *p.* 140, *Aug.* 6, 1943.

2901 541.141

Action of light on cellulose. MONTONNA, R. E., AND WINDING, C. C. *Industr. Engng Chem.*, 35, *pp.* 782–784, *July*, 1943.—A satisfactory method for determining the copper numbers of cellulose acetates is developed. The results of determinations on various samples indicate a high degree of degradation in the lower-viscosity cellulose acetates. Light increases the copper number of cellulose acetate, exposed either in the solid phase or in solution.

2902 541.144.7

Flash saturation and reaction periods in photosynthesis. RIEKE, F. F., AND GAFFRON, H. *J. Phys. Chem.*, 47, *pp.* 299–308, *April*, 1943.—A method is described for making the intervals betw. flashes of unequal length without varying the average intensity. The reaction responsible for flash saturation during photosynthesis in the alga *Scenedesmus* is not sensitive to cyanide, the apparent effect of which is due to another reaction, probably concerning the initial fixation of CO_2. With light flashes spaced far enough apart, no reversion to normal photosynthesis occurs in the photo-reduction of CO_2 proceeding with absorption of H_2. Under these conditions, a flash saturation is observed which attains approx. the same value as the aerobic flash saturation. In varying the interval betw. the flashes producing flash saturation in photo-reduction, the length of the dark interval betw. flashes necessary to maintain flash saturation is the same as that observed with normal photosynthesis. There is evidence that the truly photochemical processes remain unchanged whether CO_2 is reduced with the evolution of O_2 or with the absorption of H_2.

N. M. B.

2903 541.144.8

A versatile apparatus for photolysis studies in the gas phase. I. Acetone and iodine mixtures. BENSON, S. W., AND FORBES, G. S. *J. Amer. Chem. Soc.*, 65, *pp.* 1399–1405, *July*, 1943.—A description is given of apparatus for the study of the flow photolysis of mixed vapours. A l.p. system for the microanalysis of hydrocarbon vapours is described. The photolysis of acetone by λ2 537 Å in the presence and absence of iodine was investigated over the range 60°–140°. Min. activation energies are found of 16 kcal./mole for the decomposition of acetyl radicals and 9 kcal./mole for the formation of acetyl iodide from acetyl radicals and iodine.

2904 541.144.8

Photochemical studies. XXXVI. Quantum yields during the photochemical decomposition of *n*-butyl methyl ketone. WILSON, J. E., AND NOYES, W. A., JR. *J. Amer. Chem. Soc.*, 65, *pp.* 1547–1550, *Aug.*, 1943.—The quantum yields were obtained as function of intensity, pressure, wavelength and temperature. The yields for the main products of the reaction are nearly independent of all the variables studied.

2905 541.147 : 771.535

On the nature of the latent images formed in photographic emulsions due to light absorption and to the passage of ionizing particles. BOSE, D. M. *Indian J. Phys.*, 17, *pp.* 27–37, *Feb.*, 1943.—Compares the mechanism of latent-image formation by photons and by ionizing particles. In the former, the action proceeds from the grain surface inwards, in the latter from inside to the surface. The first process thus favours the formation of surface, the other of internal, latent images; it follows that emulsions with large-grained particles are more sensitive to photons than fine-grained emulsions, and vice versa for ionizing particles. Webb's theory, which assumes varying photon sensitivity of silver halide grains, is discussed and experimental evidence is given suggesting a similar variation in the case of ionizing particles. A. H.

See Abstr. 2889 541.147.2 : 541.124

2906 541.18.025

Thixotropic behaviour of oils. WELTMANN, R. N. *Industr. Engng Chem.* (*Analyt. Edit.*), 15, *pp.* 424–429, *July* 15, 1943.—Oils in the viscosity range 1–800 poises were examined on a rotational viscometer and flow curves were obtained. All the oils exhibited the characteristics of thixotropic plastics above a certain rate of shear, related to the measured Newtonian viscosities of the oils.

2907 541.182.5

An alumina hydrogel. JOHNSON, F. C. *Nature, Lond.*, 152, *p.* 415, *Oct.* 9, 1943.

2908 541.182.5

Gel formation in vinyl-divinyl copolymers. STOCKMAYER, W. H., AND JACOBSON, H. *J. Chem. Phys.*, 11, p. 393, *Aug.*, 1943.

2909 541.182.6.046 : 541.183.611

Mechanism of the mutual coagulation process. III. WEISER, H. B., AND MILLIGAN, W. O. *J. Phys. Chem.*, 47, *pp.* 424–436, *June*, 1943.—Changes in the composition of the electrical double layer on the sol particles of hydrophobic sols were followed by potentiometric analysis when two sols of opposite sign of charge are mixed in varying ratios. The mutual adsorption of oppositely charged particles results in a lowering of the ζ-potential (or mobility) of the mixed particles, and this mutual adsorption is accompanied, in general, by displacement of the counter ions of the double layer. These displaced ions may remain in the intermicellar solution or the displaced counter ions of one sol may be adsorbed by the particles of the second, thereby opposing the lowering of the ζ-potential. Variations of ion activities are noted and discussed. N. M. B.

See Abstr. 2715, 2716 541.183 : 532.62

2910 541.183.2

Sorption of water vapour by soap curd. MCBAIN, J. W., AND LEE, W. W. *Industr. Engng Chem.*, 35, *pp.* 784–787, *July*, 1943.—Anhydrous soap takes 1 or 2% of water according to a sorption mechanism of physical type. Except for Na oleate, the curd or super-curd then suddenly forms a hemihydrate, which again takes up water more rapidly (10 or 12%) until another phase forms. At low temperatures these new phases are higher hydrates which readily revert to hemihydrate when the rel. humidity falls by 15%. The sorption curves show the presence of capillary liquid in pores and interstices of the fibrous mass.

See Abstr. 2909 541.183.611 : 541.182.6.046

2911 541.23(047.1)

Report of the Committee on Atomic Weights of the American Chemical Society. BAXTER, G. P. *J. Amer. Chem. Soc.*, 65, *pp.* 1443–1447, *Aug.*, 1943.

See Abstr. 2708 451.265 : 532.14 : 532.133

2912 541.61 : 537.533.73

An electron diffraction investigation of biphenylene. WASER, J., AND SCHOMAKER, V. *J. Amer. Chem. Soc.*, 65, *pp.* 1451–1455, *Aug.*, 1943.—Electron diffraction investigation of biphenylene confirms the formula assigned by Lothrop. Quantum-mechanical calculations of the resonance energy and relative bond strengths were made.

2913 541.62

On the number of structural isomers in simple ring compounds. II. HILL, T. L. *J. Phys. Chem.*, 47, *pp.* 413–421, *June*, 1943.—Equations are given which make it possible to calculate the number of structural isomers in a simple symmetrical ring of n members for any value of n and any kind of substitution (see Abstr. 2438 (1943)].

2914 541.634

***cis-trans* isomerization and spectral characteristics of carotenoids and some related compounds.** ZECHMEISTER, L., AND POLGÁR, A. *J. Amer. Chem. Soc.*, 65, *pp.* 1522–1528, *Aug.*, 1943.—When a hexane solution is refluxed or catalysed with iodine, a new maximum develops betw. 320 and 380 mμ. This is termed the *cis*-peak effect. The abs. position of the max. depends on the structure of the chromophoric system.

2915 541.634

The configuration of 1,3-butadiene. RASMUSSEN, R. S., TUNNICLIFF, D. D., AND BRATTAIN, R. R. *J. Chem. Phys.*, 11, *pp.* 432–433, *Sept.*, 1943.

2916 541.634

Action of cold concentrated hydriodic acid on carotenes: structure and *cis-trans*-isomerization of some reaction products. POLGÁR, A., AND ZECHMEISTER, L. *J. Amer. Chem. Soc.*, 65, *pp.* 1528–1534, *Aug.*, 1943.—If petroleum ether solutions of α- or β-carotene are shaken with cold, conc. HI, a chromatogram shows no unchanged starting material but smaller amounts of new pigments, 2 of which have been crystallized. The dihydro compounds show reversible *trans–cis*-isomerization, on heating, melting, acid or iodine catalysis; the spectroscopic *cis*-peak effect was observed.

2917 541.634

***cis-trans* isomerization and spectral characteristics of gazaniaxanthin. Further evidence of its structure.** ZECHMEISTER, L., AND SCHROEDER, W. A. *J. Amer. Chem. Soc.*, 65, *pp.* 1535–1540, *Aug.*, 1943.—Gazaniaxanthin was studied by methods causing *trans–cis* changes in solution and in melt. On the Tswett column 2 groups of neo-compounds appeared, the further differentiation of which was difficult. The molecular extinction curve of all-*trans*-gazaniaxanthin shows a flat max. around 350 mμ. Upon heating or iodine catalysis, a *cis*-peak develops.

See Abstr. 2893 541.64 : 541.127

See Abstr. 2918 541.64 : 541.128.1 : 541.653

See Abstr. 2784 541.653 : 535.56

2918 541.653 : 541.128.1 : 541.64

Optically active acyl peroxides. Preparation, decomposition and use as catalysts for vinyl polymerization. MARVEL, C. S., FRANK, R. L., AND PRILL, E. *J. Amer. Chem. Soc.*, 65, *pp.* 1647–1652, *Aug.*, 1943.—The preparation of 2 optically active acyl peroxides, *l-p-s*-butylbenzoyl peroxide and *l-o*-carbomenthoxybenzoyl peroxide, is described. The thermal decomposition of *l-o*-carbomenthoxybenzoyl peroxide was followed by optical methods and found to follow first-order kinetics. No evidence that use of an optically active peroxide will cause an asymmetric synthesis in vinyl polymerization has been obtained. [See Abstr. 1245 (1943)].

2919 541.653.3

Further observations on the optically active $\alpha\gamma$-dimethylallyl alcohols. BALFE, M. P., HILLS, H. W. J., KENYON, J., PHILLIPS, H., AND PLATT, B. C. *J. Chem. Soc.*, *pp.* 348–351, *Aug.*, 1943.—Hills, Kenyon and Phillips described the erratic mutarotation of (+)-$\alpha\gamma$-dimethylallyl alcohol and the preparation of an unusual *laevo*-alcohol from the *laevo*-chloride. These peculiarities are not shown by other substituted allyl alcohols. The general conclusion that these alcohols and their derivatives can undergo anionotropic rearrangement, which is accompanied by partial racemization, does not explain the peculiarities of $\alpha\gamma$-dimethylallyl alcohol. Re-examination of the (+) alcohol indicates that during the mutarotation a

laevorotatory substance is formed which is also present in the alcohol obtained from the *laevo*-chloride.

2920 541.653.3

Ring structures and mutarotations of the modifications of *D*-galacturonic acid. ISBELL, H. S., AND FRUSH, H. L. *J. Res. Nat. Bur. Stand., Wash.*, 31, *pp.* 33–44, *July*, 1943.—The two crystalline modifications of galacturonic acid are a pair of α-β pyranoses analogous to the α and β galactopyranoses. On oxidation with Br water, the modifications yield optically active lactones of mucic acid.

2921 542.41

An apparatus for the study of the kinetics of thermal decompositions. ANDERSON, R. B., ROWLEY, H. H., AND MAKENS, R. F. *Proc. Iowa Acad. Sci.*, 49, *pp.* 291–294, 1942.

2922 542.46

An improved vapour thermoregulator. YEE, J. Y. *Industr. Engng Chem.* (*Analyt. Edit.*), 15, *pp.* 462–463, *July* 15, 1943.

2923 542.48

A molecular still of new design. QUACKENBUSH, F. W., AND STEENBOCK, H. *Industr. Engng Chem.* (*Analyt. Edit.*), 15, *pp.* 468–470, *July* 15, 1943.—A cyclic still for use in purification is described. The evaporator surrounds the condenser. During a distillation, a magnetically driven rotor spreads the incoming distilland in a thin film over the evaporator surface. The still is glass-surfaced throughout.

2924 542.48 : 518.5 : 545.2 : 615.9

Apparatus for distilling alcohol from biological fluids and a calculator for Harger titrations. MARRON, T. U., AND BANWARTH, C. S. *Proc. Iowa Acad. Sci.*, 49, *pp.* 275–280, 1942.

2925 542.49

A vacuum sublimation and molecular distillation apparatus. RIEGEL, B., BEISWANGER, J., AND LANZL, G. *Industr. Engng Chem.* (*Analyt. Edit.*), 15, *pp.* 417–421, *July* 15, 1943.—Consists of a manifold maintained at 10^{-5} mm. and an auxiliary degassing line. The manifold is equipped with 12 ground-glass openings of various sizes for use with different types and sizes of stills.

2926 542.66

Delivery of liquids at low and constant rates. PAGE, E. C., JR., AND WHITWELL, J. C. *Industr. Engng Chem.* (*Analyt. Edit.*), 15, *pp.* 435–437, *July* 15, 1943.

2927 542.8

Improved electrometric apparatus. MCKINNEY, C. D., JR., AND HALL, R. T. *Industr. Engng Chem.* (*Analyt. Edit.*), 15, *pp.* 460–462, *July* 15, 1943.—Describes a simple electrometric apparatus using the dead-stop technique for determining the end point.

2928 542.8

Polarographically controlled syntheses, with particular reference to organic chemistry. LINGANE, J. J., SWAIN, C. G., AND FIELDS, M. *J. Amer. Chem. Soc.*, 65, *pp.* 1348–1353, *July*, 1943.—The method of polarographic synthesis was applied to the reduction of 9-(*o*-iodophenyl)-acridine. A cell and procedure are described with which it was possible to prepare compounds in a high state of purity, and with quantitative yield, by control of the potential of a working Hg cathode.

See Abstr. 2924 545.2 : 615.9 : 518.5 : 542.48

2929 547.915

Fixed oil from the seeds of *Gnetum scandens* (Roxb.). VARIER, N. S. *Proc. Indian Acad. Sci. A*, 17, *pp.* 195–198, *June*, 1943.—The chemical and physical constants of the fatty oil from the seeds of *Gnetum scandens* (Roxb.) were studied. The oil consists of the glycerides of oleic (27%), linoleic (3%), palmitic (14%) and stearic (56%) acids.

CRYSTALLOGRAPHY

See Abstr. 2819 548 : 537.311.33

2930 548.0 : 669.14

Structure of the eta phase of the iron-silicon system. WEILL, A. R. *Nature, Lond.*, 152, *p.* 413, *Oct.* 9, 1943.

2931 548.33

The phase transformations of normal paraffins. GRAY, C. G. *J. Inst. Petrol.*, 29, *pp.* 226–234, *Aug.*, 1943.—Co-ordinates the results of several workers and puts forward an equilibrium diagram. A standardized nomenclature is suggested, and the relationship betw. the m.p. and the number of C atoms is discussed. J. T.

2932 548.33

The crystal structure of magnesium carbide. BREDIG, M. A. *J. Amer. Chem. Soc.*, 65, *pp.* 1482–1483, *Aug.*, 1943.—It is not possible to ascribe a face-centred tetragonal crystal lattice such as that of CaC I to Mg acetylide. MgC_2 may be isotypic with the metastable crystal form III of CaC_2.

2933 548.73

Change of symmetry of basic beryllium acetate. BEEVERS, C. A. *Nature, Lond.*, 152, *p.* 447, *Oct.* 16, 1943.

2934 548.73

X-ray diffraction investigation of sodium stearate from room temperature to the melting point. BRETTEVILLE, A. DE, JR., AND MCBAIN, J. W. *J. Chem. Phys.*, 11, *pp.* 426–429, *Sept.*, 1943.—Sodium stearate of the γ-polymorphic form was photographed by Cu $K\alpha$ X-rays in a powder camera betw. room temp. and 301°C. The long spacing is const. up to 132°C., whereupon it decreases up to the m.p. The 2 most intense short spacings increase up to the transition betw. stable waxy to superwaxy phase at 167°C. Both lines then coalesce up to above the final m.p., 288°C.

2935 548.73 : 539.4.016.2 : 669.355

The structural changes effected in 70 : 30 brass strip by cold rolling and annealing. COOK, M., AND RICHARDS, T. LI. *J. Inst. Met.*, 69, *pp.* 351–371, *Aug.*, 1943.—A study was made by X-ray and microscopic methods of the effect of progressively increasing cold-rolling reductions and of subsequent annealing on the structure and properties of 70 : 30 brass strips of 3 different initial grain-sizes. The mechanism of deformation during cold rolling is similar to that observed with h.c. copper, and the same twin-fibre textures are ultimately developed. The degree of preferred orientation of crystals, although dependent on the magnitude of the rolling reduction, is inde-

endent of the initial grain-size. The structural changes are correlated with the mech. properties of the olled strips.

GEOPHYSICS

2936 550.3

The geophysicist as a forecaster. WEAVER, P. *Geophysics*, 8, *pp.* 273–289, *July*, 1943.—Advocates the study of time-rate of change of a physical property in a localized area, in order to forecast when a critical point will appear in the system, with ref. to wells, mines and quarries; extraction of underground fluids; effects of weather, particularly fog; earthquakes and landslides; volcanoes.

2937 550.341 : 550.834

Secondary arrivals in a well velocity survey. HORTON, C. W. *Geophysics*, 8, *pp.* 290–296, *July*, 1943.—Seismograms obtained in a well survey showed well developed secondary arrivals which satisfied a velocity formula $V = (2\,000 + 0{\cdot}27Z)$ ft./sec. If these arrivals are assumed to be transverse waves, a value of 0·43 for Poisson's ratio is obtained. On this assumption, values of the mod. of rigidity and bulk mod. are computed. The velocity of the secondary wave does not satisfy the equation developed by Lamb.

2938 550.372 : 621.317.33 = 3

Measurement of electric conductivity in laminated soil. PFISTER, W. *Hochfrequenztechn. u. Elektroakust.*, 59, *pp.* 118–119, *April*, 1942.

See Abstr. 2937 550.834 : 550.341

2939 550.834.5

Selection of computational methods for seismic paths. ALCOCK, E. D. *Geophysics*, 8, *pp.* 297–307, *July*, 1943.—The underlying assumptions and characteristics of several common computational methods are discussed and an analysis is made for a sp. case.

2940 550.837 : 621.316.99 : 621.3.011.2

The mutual impedance of collinear grounded wires. WEST, S. S. *Geophysics*, 8, *pp.* 157–164, *April*, 1943.—[Abstr. 2363 B (1943)].

2941 550.837.3 = 4

Study of anisotropic folds by electric prospecting. POLDINI, E. *Arch. Sci. Phys. Nat.*, 25, *March–April*, (*Suppl. No.* 1, *C.R. Soc. Phys. Hist. Nat., Genève*, 60, *pp.* 6–13), 1943.—The tectonic study of geological formations consisting of anisotropic folds is shown to be possible by the surface measurement of electrical resistivity. Such measures in the St. Eloy coalfield show that the resistivity measured $\perp$ stratification $<$ that measured $\parallel$ stratification. Transverse measurements show max. resistivity at the anticlines, min. at the synclines; longitudinal measurements the reverse. The ratio of longitudinal to transverse resistivity is about 1 on anticlines and about 1·5 or 2 on synclines. A. HU.

2942 551.3.053 : 614.71

On the relation of soil conservation to air and ground-water pollution. HORTON, R. E. *Bull. Amer. Met. Soc.*, 24, *pp.* 164–166, *April*, 1943.

2943 551.311.1

The glacial anticyclone and the continental glaciers of N. America. HOBBS, W. H. *Proc. Amer. Phil. Soc.*, 86, 3, *pp.* 368–402, 1943.—The work of erosion, transportation and deposition around a continental glacier is attributed mainly to an anticyclonic air circulation of its own making in which wind velocities up to 150 m.p.h. are attained. In the brief warm season, thaw water transports ice-borne boulders to great distances in the periglacial area. The unsaturated katabatic winds off the ice in winter then dry the outwash and lift silt to be deposited as loess elsewhere, making ventifacts of the stranded boulders meanwhile, and leaving a "pebble pavement" in the outwash plain. The hypothesis is applied to the Pleistocene glaciation of N. America, special attention being given to the distribution of loess, sand and the recessional moraines. A. HU.

2944 551.311.2 : 551.583.7

Soil phenomena as evidence of climatic changes. BRYAN, K., AND ALBRITTON, C. C., JR. *Amer. J. Sci.*, 241, *pp.* 470–490, *Aug.*, 1943.—Climatic variations in moisture factor are effective in producing chemical and mineralogical changes in subsoil. Optimum conditions for the development of climatic records in soil are found in semi-arid country along belts separating soils with zones of iron enrichment from soils with zones of lime enrichment. An application of these principles to the complex soil found at Praesum in Texas shows the climate there has fluctuated between relatively wet and relatively cold. A more elaborate analysis reveals 3 dry intervals with 2 intervening moist intervals; this accords with the known record of Pleistocene erosion and deposition. J. S. G. T.

2945 551.5 : 358.4

Meteorology and the Royal Air Force. JOHNSON, N. K. *Quart. J. Roy. Met. Soc.*, 69, *pp.* 199–205, *July*, 1943.

2946 551.5 : 53

Atoms, molecules and radiation. DINGLE, H. *Quart. J. Roy. Met. Soc.*, 69, *pp.* 185–198, *July*, 1943.—The G. J. Symons Memorial Lecture, 1943.

2947 551.506.1(42)

Summary of meteorological observations during 1942 made at Camden Square (London) for the Royal Meteorological Society (British Rainfall Organization Fund). *Quart. J. Roy. Met. Soc.*, 69, *pp.* 236–237, *July*, 1943.

See Abstr. 2725 551.508.41 : 533.42

2948 551.508.71

A spectroscopic hygrometer. FOSKETT, L. W., AND FOSTER, N. B. *Bull. Amer. Met. Soc.*, 24, *pp.* 146–153, *April*, 1943.—A simple grating spectrophotometer is used with a W filament lamp and projector to measure the precipitable water in the atmosphere. Utilization is made of the 1·380 μ water-vapour absorption band and the 1·250 μ region for reference. Vacuum thermocouples and high-sensitivity galvanometer are employed for energy measurement. Calibration tests were conducted over optical paths of 1·5–52 m.

See Abstr. 2724 551.508.71 : 533.275

2949 551.510.535 : 621.396.11

A contribution to the study of the ionosphere. WALKER, G. D. *Trans. S. Afr. Inst. Elect. Engrs*, 34, *pp.* 60–84, *May*, 1943.—[Abstr. 2261 B (1943)].

2950 551.515.4

Kalbaishakhis (thundersqualls) of Bengal. SEN GUPTA, P. K. *Bull. Amer. Met. Soc.*, 24, *pp.* 96–

102, *March*, 1943.—The characteristics of the Bengal thundersqualls are described and the meteorological mechanism of their production investigated. Latent energy in the higher atmosphere is released by various processes, notably by convectional upward currents in the afternoon or by similar currents caused by moist air lifting over a mountain barrier or a cold air mass. A. HU.

2951 551.521.63 : 523.746

Variations of ultra-violet and daylight rays. ASHWORTH, J. R. *Nature, Lond.*, 152, *p.* 330, *Sept.* 18, 1943.

2952 551.525

Earth temperatures at Camden Square, London. *Quart. J. Roy. Met. Soc.*, 69, *p.* 198, *July*, 1943.

See Abstr. 2835 551.543 : 537.591.1

2953 551.554 : 532.59

Wind structure over the sea. WESTWATER, F. L. *Quart. J. Roy. Met. Soc.*, 69, *pp.* 207–213, *July*, 1943.

2954 551.574.4

The persistence of dew. DRUMMOND, A. J. *Quart. J. Roy. Met. Soc.*, 69, *pp.* 234–235, *July*, 1943.

See Abstr. 2803 551.576.11 : 536.423.45

2955 551.577.21(41/2)

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2956 551.577.3 : 551.585

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See Abstr. 2957 551.577.61 : 551.578.7

2957 551.578.7 : 551.577.61

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2958 551.58 : 621.315.687.3 = 3

Investigations of the effects of weather and climate on cable sealing ends and junction boxes in telecommunication plants. SCHULZE. *ENT* [*Elekt. Nachr. Techn.*], 19, *pp.* 199–218, *Oct.*, 1942. *Abstr. in Wireless Engr*, 20, *p.* 408, *Aug.*, 1943.—[Abstr. 2420 B (1943)].

2959 551.582.1(262)

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See Abstr. 2944 551.583.7 : 551.311.2

See Abstr. 2956 551.585 : 551.577.3

2960 551.588(7)

Some influences upon American climate of the Ocean and Gulf: an analysis of climatic charts in "Climate and Man," 1941. VISHER, S. S. *Bull. Amer. Met Soc.*, 24, *pp.* 79–84, *March*, 1943.—The influence of the sea on U.S. climate is elucidated from 40 years' data. The Pacific influences its coastal zone mainly by increasing winter temperature and precipitation. The Atlantic has less effect because the prevailing wind is off-shore; but its coastal zone has a longer frost-free season and higher winter min. temperatures than inland. The Gulf of Mexico influences temperatures only slightly, but rain during autumn and summer is heavier on the coast than inland, due to tropical cyclones from the Gulf. A. HU.

See Abstr. 2674 551.590.21 : 523.746

See Abstr. 2685 551.593 : 525.75

2961 551.593.64

The theory of coronae and of iridescent clouds. RAMACHANDRAN, G. N. *Proc. Indian Acad. Sci. A*, 17, *pp.* 202–218, *June*, 1943.—A new theory of the phenomenon is developed, using only the principles of wave optics, and taking into consideration the portions of the wave front transmitted through the droplets. Expressions are obtained for the intensity distribution in the corona. The theory explains most of the phenomena, such as the extreme susceptibility of the ring system to even small changes in the radius of the drops, and the oscillation of the ring system as the radius steadily increases. [See Abstr. 1550 (1941)].

2962 551.594.2

The electrical structure of thunderstorms. WORKMAN, E. J., HOLZER, R. E., AND PELSOR, G. T. *Techn. Not. Nat. Adv. Comm. Aero., Wash., No.* 864, *Nov.*, 1942.—The time histories of thunderstorm charge distribution during 3 storms (summer 1940) in the vicinity of the Albuquerque airport were investigated by the use of 8 synchronized recording electrometers arranged in a particular pattern over a field 1·6 km. above sea level. The instruments produced simultaneous records of the changes in surface potential gradient caused by lightning strokes; each had a time-resolving power of 0·01 sec. Horizontal and vertical cross-sectional diagrams are presented. E. R. A.

2963 551.594.2 = 3

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VARIOUS SUBJECTS

See Abstr. 2789 591.111.2 : 535.66

See Abstr. 2792 612.84 : 535.7

See Abstr. 2746, 2747 612.85 : 534.75

See Abstr. 2942 614.71 : 551.3.053

2964 614.715

The air we breathe in town and country. DOBSON, G. M. B., AND MEETHAM, A. R. *Proc. Roy. Instn*, [12 *pp.*], 1943. *Advance copy.*—[Abstr. 2334 B (1943)].

See Abstr. 2924 615.9 : 518.5 : 545.2 : 542.48
See Abstr. 2687 623.446 : 53
See Abstr. 2688 66 : 53
See Abstr. 2686 66 : 621.3 : 53
See Abstr. 2702 66.063 : 531.78
See Abstr. 2855 666.1 : 539.213.2
See Abstr. 2771 667.2 : 535.341-31
See Abstr. 2778 667.5 : 774 : 535.668 : 535.371
See Abstr. 2930 669.14 : 548.0
2965 669.355

Properties of cast red brass as affected by the ambient atmosphere during melting. GARDNER, H. B., KRYNITSKY, A. I., AND SAEGER, C. M., JR. *J. Res. Nat. Bur. Stand., Wash.*, 31, *pp.* 125–140, *Sept.*, 1943.—A study was made of the physical properties of red brass (Cu, 85; Sn, 5; Pb, 5; Zn, 5), melts of which had been made and poured in an atmosphere of H, N, CH_4, CO and air. The tensile properties, hardness, density and electrical resistivity of the sand-cast bars, in general were inferior to those of the chill-cast metal. For both the sand-cast and chill-cast bars H and CH_4 had deleterious effects. The effect of H was most pronounced and detrimental. The unsoundness of the H-treated metal, as shown by microstructural study and by density surveys, is the most important factor responsible for the inferior properties of the metal treated in this way.

See Abstr. 2935 669.355 : 539.4.016.2 : 548.73
See Abstr. 2700 675 : 531.754
See Abstr. 2859, 2860 676 : 539.217
See Abstr. 2880 677.46 : 539.501
See Abstr. 2845 678 : 539.13
See Abstr. 2846 678 : 539.132
See Abstr. 2882 678 : 539.537
See Abstr. 2867 679.5 : 539.4
See Abstr. 2783 679.56 : 539.379 : 535.551
See Abstr. 2868 679.56 : 539.4
See Abstr. 2689 727 : 53
See Abstr. 2764 77 : 535.338.3
2966 771.535

The photographic latent image. I. Lattice energy and related quantities for a hypothetical silver bromide crystal having the cubic ZnS type of structure. II. Outline of the theory. HUGGINS, M. L. *J. Chem. Phys.*, 11, *pp.* 412–426, *Sept.*, 1943.—The NaCl type of structure (*B*1) for AgBr is compared with a hypothetical structure for this substance of the cubic ZnS type (*B*3) with reg. to lattice energy, equilibrium distance betw. closest atoms, density, potential at interstitial positions, potential-energy changes as an ion moves from its normal position to an interstitial position, and as an ion or electron moves from one interstitial position to another.—A theory of the formation and growth of the latent image and of the development process in the crystal containing it is outlined. It is assumed that the latent image consists of a small region of the (silver halide) crystal in which the atomic arrangement is the "tetrahedral" *B*3 type, stabilized by the presence of one or more photo-electrons, with or without extra Ag ions.

See Abstr. 2905 771.535 : 541.147
2967 772/773 : 621

Photography in the drawing office. TRITTON, F. J. *Photogr. J.*, 83, *pp.* 329–337, *Sept.*, 1943.—[Abstr. 2350 B (1943)].

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2968 777

Half-tone densities. DORST, P. W. *J. Opt. Soc. Amer.*, 33, *pp.* 436–439, *Aug.*, 1943.—Discusses relationship betw. tone value and dot area. A mathematical treatment is given of the dot area required for a given reproduction density. The expression obtained, however, is not convenient for everyday use and 2 methods for rapid computation are described, one graphical, the other using a special slide rule. A. H.

See Abstr. 2739 786 : 534.321.33
See Abstr. 2737 786.2 : 534.32

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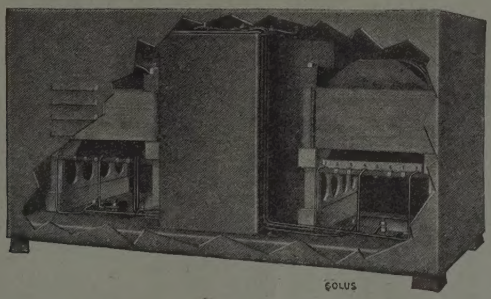

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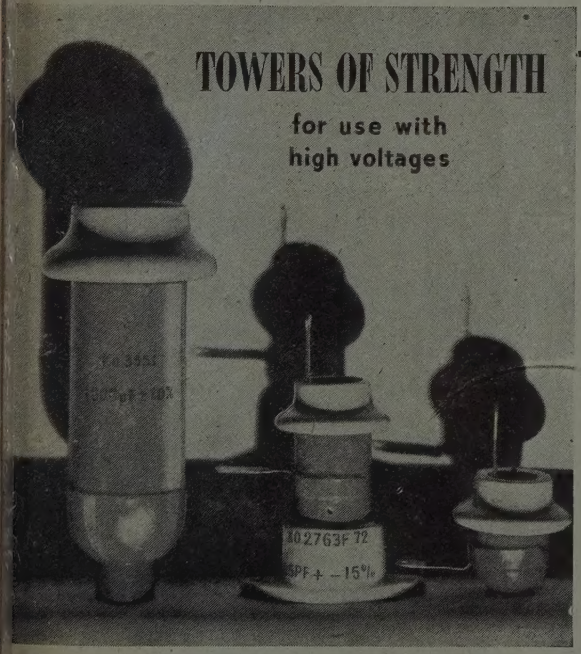

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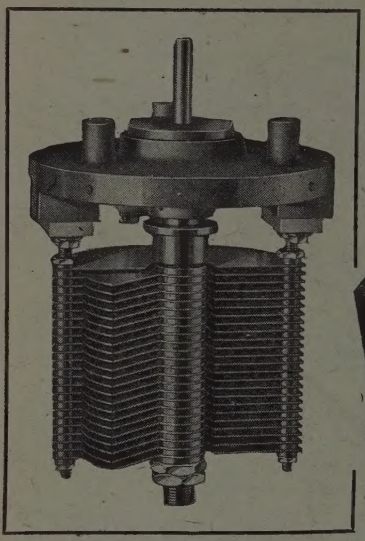

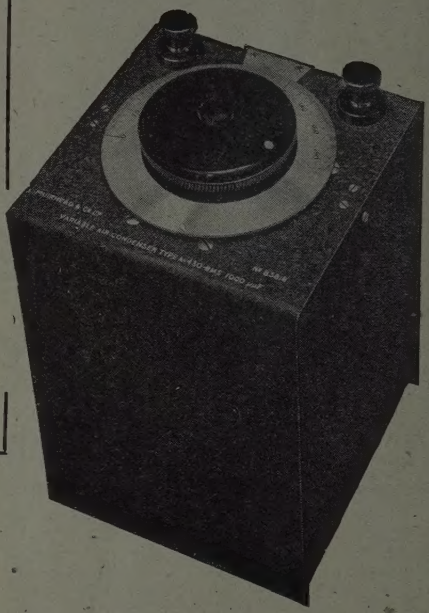

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